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2. The preservation and development of our national resources by the construction of storage reservoirs by the Federal Government for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction.

3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.

4. The preservation of the forests and reforestation of denuded forest areas as sources of water supply, the conservation of existing supplies by approved methods of irrigation and distribution, and the increase of the water resources of the arid region by the investigation and development of underground supplies.

5. The adoption of a harmonious system of irrigation laws in all the arid and semi-arid states and territories under which the right to the use of water for irrigation shall vest in the user and become appurtenant to the land irrigated, and beneficial use be the basis and the measure and limit of the right.

6. The holding of an annual Irrigation Congress, and the dissemination by public meetings and through the press of information regarding irrigation, and the reclamation and settlement of the arid public domain, and the possibilities of better agriculture through irrigation and intensive farming, and the need for agricultural education and training, and the creation of rural homes as national safeguards, and the encouragement of rural settlement as a remedy for the social and political evils threatened by the congestion of population in large cities.

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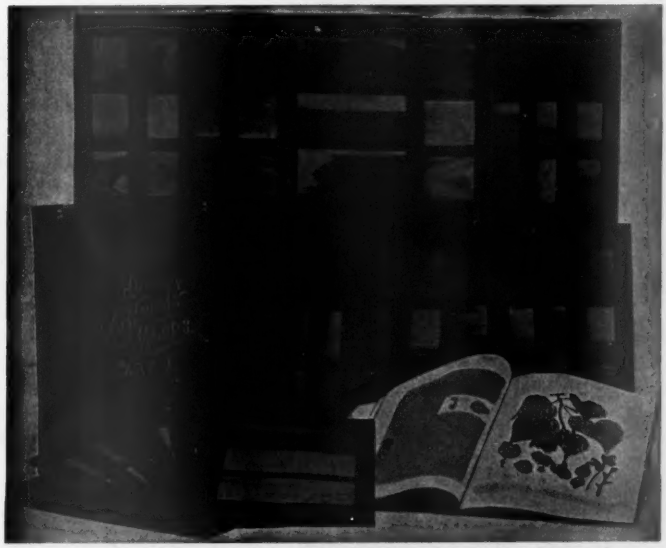

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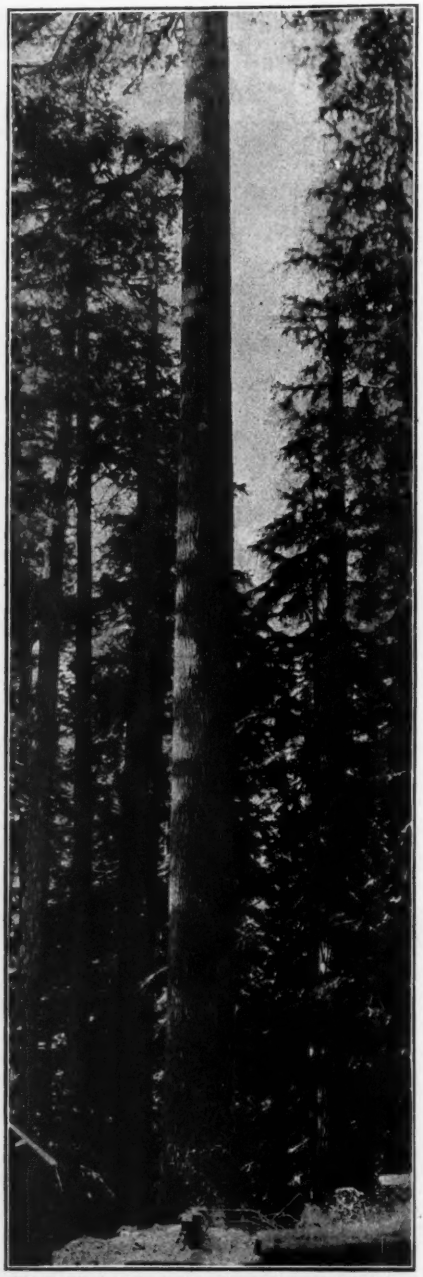

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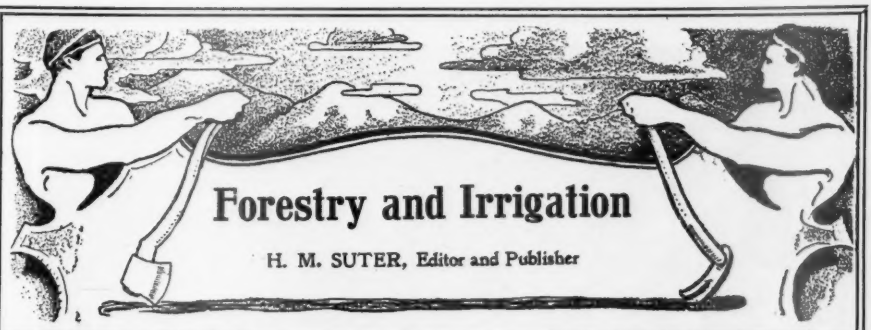

Forestry and Irrigation

H. M. SUTER, Editor and Publisher

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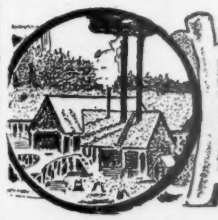

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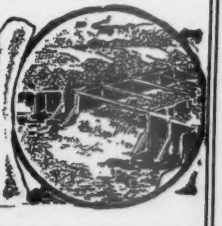


THE DRIVE. A JAM OVERTAKEN BY A LATE FREEZE.

Forestry and Irrigation.

VOL. X. MARCH, 1904. No. 3.

NEWS AND NOTES.

The Crisis at Albany. Last spring more than half a million acres of forest land in northern New York were ravaged by fires resulting from the unparalleled drought and the carelessness and viciousness of human kind.

The railroads, seemingly in arrogant consciousness of power, broke almost every provision of the law relating to the precautions to be observed by them within forest lands. They were responsible for more than 50 per cent of the acreage burned in the Adirondacks, but so far they have escaped scot-free with the exception of private suits for damage.

The railroads are the greatest danger which threatens the welfare of New York forests. Next in order come the careless use of fire in fallowing, and incendiarism arising from the growing resentment the natives feel toward the encroachments of great private game preserves upon hunting grounds formerly free to all.

New York stands at the parting of the ways. The time has come when she must either adopt an up-to-date, vigorous, rational policy in regard to the forests of the Adirondacks and the Catskills, or else relinquish the worthy position which for years has distinguished her among all the states as the foremost in matters of forest economics.

Her forest laws have never been perfect. Their claim to merit is based largely on comparison with other states, which have either worse laws or none at all. They can no longer endure comparison with those states which are about to enact codes based on the recommendations of experts in forestry.

The existence of the Senate Committee on Forest Policy (whose report appears in this number) is a hopeful sign. We do not doubt the ability or zeal of its chairman, Senator Brown. The recommendations are good, although almost too conservative considering the value of the property whose safety depends upon them. Nothing less will suffice, and yet we can hardly hope that bills based upon them will ever become law, unmodified and unmutilated, considering the opposition and the pitfalls which surely await them in the Legislature and elsewhere.

If the severe lesson of last year does not arouse the people of the state and their representatives to vigorous and well directed action for the protection of the forests at this time, there is indeed little hope for the Adirondacks. Conditions there will not improve by being let alone. One more catastrophe like that of 1903, and there will be little left worth protecting.

If a good law is secured it is up to the governor to see that it is rigidly enforced. There is too much regard for the feelings of powerful corporations in New York. For the sake of New York's forests we could wish that Mr. Roosevelt were governor still.

If the present opportunity is allowed to pass, a lasting stigma should and will rest upon the Legislature; the old excuse of ignorance is no excuse now. There are plenty of Americans who know very well what needs to be done, and there can be no defense for the enactment of any more such confessions of impotence as the constitutional clause at present in force, which evident fear of timber frauds has so encumbered with preventives that it defeats its own true purpose by preventing the necessary care of the forest lands.

Important Desert-land Decision. A recent important decision affecting entries made under the desert-land act by the Secretary of the Interior is contained in the following letter to the Commissioner of the General Land Office:

The Commissioner of the General Land Office.

SIR: By decision of July 23, 1903 (32 L. D., 207), the department accepted the final proof of John Cunningham under his desert-land entry for the S. E. ¼ of the N. E. ¼, sec. 21; the S. W. ¼ of the N. W. ¼ and the N. ½ of the S. W. ¼, sec. 22, T. 43 N., R. 108 W., Landor, Wyoming, land district.

It is possible that some expressions in that decision may be taken as indicating a purpose to encourage the offer and sanction the acceptance of final proofs in desert-land entries that do not clearly establish a strict compliance with all the requirements of law. Such a result was not contemplated when that decision was rendered, nor does the department intend that there shall be any relaxation in the enforcement of the requirement that such proofs shall conclusively demonstrate that the law and regulations governing such matters have been complied with in every essential particular.

Possibly the proof in that case was not so clear and explicit as such proofs should be; yet it is not deemed necessary or advisable to recall the decision accepting it for further consideration for the purpose of laying down with greater exactness the proper rule to be observed in passing upon final proofs in desert-land entries.

Proof which shows that because of irrigation there is, on the land, "a marked increase in the growth of grass," or that "grass sufficient to support stock has been produced on all the land," will not be accepted as showing a compliance with that provision of the amendatory act of 1891 (26 Stat., 1095) "that proof be further required of the cultivation of one-eighth of the land." Actual tillage must, as a rule, be shown. If, however, it be shown, and it must be made to conclusively so appear, that, because of climatic conditions, crops other than grass can not be successfully produced, or that actual tillage of the soil will destroy or injure its productive qualities, the actual production of a crop of hay of merchantable value, as a result of actual irrigation, may be accepted as sufficient compliance with the requirement as to cultivation.

That the entryman has an absolute right to sufficient water to successfully irrigate the land; that the system of ditches to conduct the water to and distribute it over the land is adequate for those purposes, and that the land has been actually irrigated for a sufficient period of time to demonstrate the sufficiency of the water supply and the effectiveness of the system are essential facts which must in all cases be clearly established by the proofs.

You will take such measures as may be proper to bring these matters to the attention of the local land officers.

Very respectfully,

E. A. HITCHCOCK,
Secretary.

This decision will be of great aid to the reclamation service in protecting the lands withdrawn in connection with the various Federal irrigation projects. Desert-land entries made prior to these withdrawals and coming within their areas will have to come up to the prescribed standard or be canceled.

Death of Henry Michelsen. Henry Michelsen, supervisor of the Pike's Peak Forest Reserve, died February 19 of pneumonia, at his home, in Denver, Colorado, aged 56 years.

Mr. Michelsen was born in Schleswig-Holstein. He had a remarkable career, and had traveled a great deal in the old world and obtained a general knowledge and education much above the average.

He became a citizen of the United States in 1869, and the same year entered upon his work as a railroad man, which occupation he followed in various positions and localities for more than thirty years.

He helped build the International and Great Western, and was prominently connected with the Galveston, Houston and Henderson road, in Texas.

Later, until 1898, he had charge of the freight business of the Colorado and Southern. In July, 1902, he became supervisor of the Pike's Peak group of reserves. His personal energy and understanding of his work soon made his reserve known as a model of administration.

Mr. Michelsen was a student of forestry, geology, political economy, and kindred topics. He spent much time in preparing articles upon these subjects, which attained considerable circulation in the magazines.

At the time of his death he was vice-president of the American Forestry Association for Colorado, and of the Colorado Forestry Association as well. He was also a member of the National Irrigation Association, the American Association for the Advancement of Science, and of the National Geographic Society.

The Sportsmen's Show. The tenth annual exhibition of the Sportsmen's Exposition Company, which was held at Madison Square Garden, seemed to take the public fancy quite as strongly as did its predecessors.

Exhibits crowded the entire available space, and the center was occupied by a great tank, upon which canoe races, tilting, and birling were carried on. This artificial lake also allowed of the display of launches and automobile boats.

The east end of the garden was made to represent a mountain scene, through which dashed a real stream, which turned the wheel of an old mill and passed on to supply one of the tanks.

Guides from all the famous sporting regions maintained model camps, as has been the custom at previous shows, and much greenery was in evidence.

A feature was the fly-casting contests, which took place every day under the rules of a special committee. The show began February 19 and lasted until the fifth of the present month.

Development of Red Gum. Red gum (*Liquidambar styraciflua*) is rapidly gaining in favor with the lumber trade. Nearly every issue of the lumbermen's journals pay increased attention to the interests of those who manufacture it and the increased capital and brains devoted to its introduction and to the overcoming of certain prejudices against it. "Doubtless," says an exchange, "the scarcity of other staple and higher-priced materials has had something to do with the interest that has lately been manifested in gum. A few manufacturers, firmly convinced of success, have for several years past encountered the usual difficulties to be met in introducing any new thing, until by degrees the objectionable features have practically been overcome. Efforts of individual concerns have been combined and a systematic educational campaign has been started. First of all, uniform grades were necessarily established, and to facilitate this work the Dressed Gum Lumber Manufacturers' Association was organized by a small body of determined men, honest in their conviction that gum, properly treated and carefully selected, is unquestionably the best suited medium-priced wood for building material obtainable, not even excepting yellow pine. Tests, indoors and out, have demonstrated the truth of these statements, and the increasing number of satisfied users is fast adding preponderance to these arguments."

Among the main objections which have kept gum in the background heretofore are its tendencies to warp and to discolor in drying, making necessary certain preventive treatment which is not employed with other woods. To prevent discoloring, girdling is practiced by some operators. Others claim to secure the same brightness of lumber by felling only in the winter.

On account of the growing interest in gum and the valuable substitute which it offers for other hardwoods now becoming scarce, the Bureau of Forestry has lately begun to investigate the stand and properties of this wood and the present marketing conditions. It is hoped that the investigations will result in the collection of information valuable

to both the trade and consumers as soon as the field notes can be properly worked up. The work is in charge of Mr. Alfred K. Chittenden, who is at present in the field with a party on the Santee River in South Carolina. A second party is at work in Missouri.

Canadian Pacific's Enterprise. It is announced that the Canadian Pacific Railway is preparing to reclaim a large tract of land located a little east of Calgary, in Alberta. The tract is 150 miles long by 60 miles wide and contains 5,700,000 acres.

The preliminary surveys are complete and it is estimated that about 1,500,000 acres can be put under irrigation at a cost approximating $3.00 per acre.

Meetings of Foresters. An open meeting of the Society of American Foresters was held at the residence of Mr. Gifford Pinchot, Thursday, February 11.

The first speaker was Mr. John S. Foley, who, in the absence of Mr. Raphael Zon, presented for the latter gentleman an interesting study of chestnut carried on over parts of Anne Arundel, Calvert, Charles, and Prince George counties, in Maryland. The discussion was illustrated by novel diagrams based on the curves secured from the surveys, and included comparative data secured from seedling and coppice growth.

Mr. Charles A. Scott, in charge of the planting reserve at Halsey, Nebraska, outlined the work which has been done in establishing the forest nursery at that point, with a general statement of the methods employed in raising the seedlings, results secured in planting in the Sand Hills, and the expense per 1,000 seedlings of the various operations. The original nursery has received two additions, one of which employs a new style of movable sun-screens.

The following Thursday the meeting took place in room 135, in the offices of the Bureau of Forestry.

Mr. Potter named the ten principal objections which are offered to the establishment of forest reserves, and showed the mistaken conceptions which are so largely responsible for this opposition.

Mr. H. J. Tompkins talked of the California forests from the point of view of a fire study. He believes that the incessant surface fires are out of all proportion to the needs of the situation, and are the result of the most general carelessness and indifference. The troublesome and useless chaparral is largely due to the action of repeated fires. The most obvious remedy is first to decrease the number of fires, in order to accomplish which the people must be made to realize the harm done by even light burns.

Mr. Hodge gave a general outline of the plan for protection of California forests, the field work for which was partly done last summer under his superintendence.

Mr. Sudworth read resolutions on the death of Mr. W. C. Whitney, an associate member of the Society, which were adopted by the members present. It was ordered that a copy be sent to the bereaved family, and that the resolutions be spread upon the records of the Society.

Extraordinary Timbers. The eight corner poles that are to support the Washington State building at the World's Fair at St. Louis have arrived. Seven of the poles are 100 feet long; the eighth is 110 feet long. Each is squared to 24 inches for its full length.

With the poles came a round pole, 100 feet long, which will be used as the flag-staff for the Hoo-Hoo House. The poles are of Douglas fir, weigh 21,120 pounds, and contain 5,200 feet of timber. They were shipped on four flat cars from Skagit county, near Tacoma, and the freight bill was $1,100.

The eight squared timbers are said to be the most valuable pieces of timber, aside from rare woods, ever cut. Their great value lies in their length. It is not unusual to find a tree that will yield a round and tapering pole of 100 feet long, but it is very unusual to find one which will permit of being squared to 24 inches for 100 feet of its length.

The World's Fair. It seems that the space allotted to forestry in the Palace of Forestry, Fish, and Game is not likely to prove sufficient for all the exhibits entered. On this account a part of the exhibits will be installed in the building of the House of Hoo-Hoo.

In addition to the exhibits of the states and the United States previously mentioned in these columns, the manufacturers of forest products, such as wooden ware, cooperage, basketry, wood-pulp, wood-alcohol, turpentine, and resin, need a great deal of room.

The outdoor display of forest management, forest extension, and such forest products as are too large for accommodation in the building already requires 15 acres of space.

As Others See Us. We have become so accustomed in the past few years to hear only depreciatory and apologetic mention of our progress in the art of forestry, that it is distinctly refreshing to encounter a more hopeful view of American ability and accomplishment along this line.

Such comment is the more grateful in that it comes from an old-world critic.

A recent issue of the *Indian Forester* speaks as follows of the work of the Bureau of Forestry in the Philippines:

"We note that our American cousins have imported some of their characteristic dash and up-to-dated-ness into their newly acquired possessions, and the forest department of the islands appears to have already commenced work on the best possible lines. The American Bureau of Forestry has inspected the forests and prescribed rough plans of working under which a royalty is charged on all trees felled, and only those trees which have previously been selected and marked by the department can be felled and logged by the lumbermen. The forests are thus preserved from that reckless and extravagant cutting which so often follows the taking over and opening out of a country by a highly civilized power. There can be little doubt of the value of the American Bureau of Forestry. India still sits and waits for hers!"

Would it not be as well for us to give up the Uriah Heep attitude for a while? It is liable to become chronic otherwise, though we know well that Europeans would select any other trait than meekness for our national characteristic.

We need not close our eyes to our

A MOUNTAIN RESERVOIR FED FROM ETERNAL SNOWS.

present imperfections, nor lose sight of the fact that there is a big job ahead, but we should at least recognize the fact that a great work has already been done in giving its present irresistible force to the movement which will finally place American forests on a safe and rational basis of management.

February Forest Fire. Dispatches from Albuquerque and Las Vegas, New Mexico, say that a fierce forest fire broke out on the Las Vegas grant, about 18 miles from Las Vegas and close to the Pecos Reserve, early on the morning of February 13.

The rangers and all available aid immediately began to fight the flames, which were driven by a strong wind. The country was very dry and the fire fighters were unable to make any effective resistance to the fire, which burnt out on the morning of the fifteenth.

The loss includes many thousands of dollars' worth of pine timber and lumber and two ranch houses, with all their adjacent buildings. The village of Las Dispensas was saved by a shift of wind. It is believed that considerable stock perished.

Errata. The kindly interest of our readers is evinced by two letters from the West drawing attention to an error and an omission in recent notes of forest fires in California. It is a matter of regret that the only source of information on these matters (the leading newspapers of the region) has proved so unreliable. Any such corrections are always welcome.

From a trustworthy source we have had a letter stating that accounts of the Fredalba fire in January were grossly exaggerated. It says: "The area burned over was 3,500 acres instead of 40,000, as formerly reported, of which 1,500 acres were in the San Bernardino Reserve. Practically no standing timber was destroyed, the burn being confined to cut-over land and chaparral. The Brookings Lumber Company lost 2,000,000 feet of sawed timber instead of 5,000,000. The cause was undoubtedly the carelessness of the men in charge of donkey engines on the Brookings works, and the company advanced the theory of incendiarism to cover the guilt of their own men.

"The Brookings Lumber Company is a curse to the reserve, and they should be made responsible for the damage the fire caused. Their carelessness and indifference is notorious, and their lumbering is a systematic process of devastation."

Another letter from California states that we have made no mention of extensive fires in Shasta county during August, September, and October, 1903, which involve more than 30,000 acres of land owned by the United States, T. B. Walker, Buick and Wengler, and the Mountain Copper Company. The cause of these fires is said to be incendiarism on the part of local cattlemen, who wished to drive out encroaching bands of sheep and goats.

Forest Reserve Personals. Ranger G. B. Coleman has been placed in charge of the western division of the Washington Forest Reserve. Ranger Geo. W. Milham is in charge of the eastern division of the same reserve.

Ranger Louis F. Mosimann has been transferred from the Gila River Forest Reserve to the Pecos River Forest Reserve, in New Mexico. Ranger Ernest E. Wright has been transferred from the Lincoln Reserve to the Gila River Reserve.

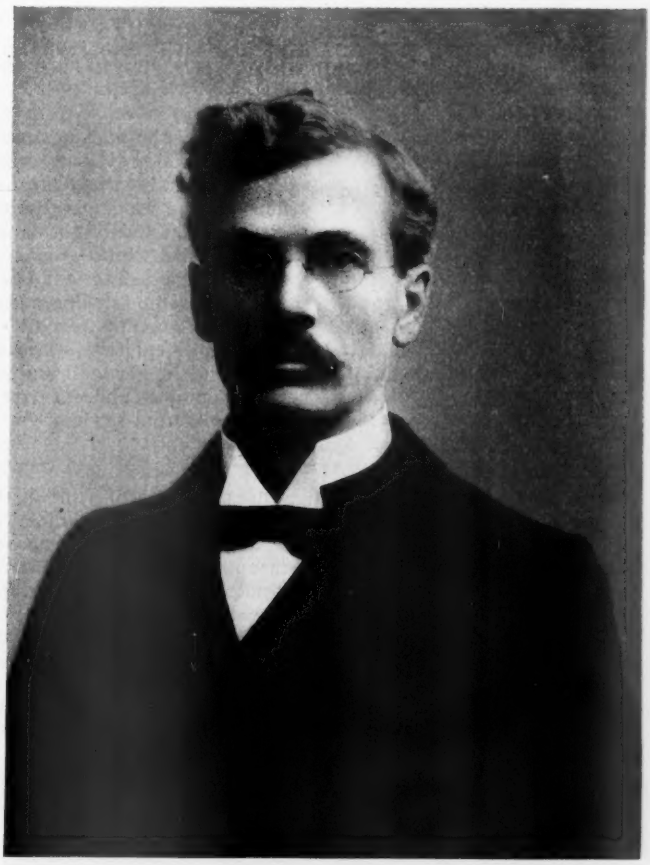
Forest Inspector R. H. Charlton is initiating administration of the Aquarius Reserve, in Utah, and the Pocatello Reserve, in Idaho.

Forest Inspector Louis A. Barrett has left Washington for examination of reserves in the Southwest.

Ranger W. D. Edmandston has been placed in charge of the Pike's Peak group of reserves.

Supervisor E. F. Morressey, of the Wichita Reserve, has recently been granted an advance in salary.

Harry T. Britten, formerly employed as a ranger in the Yosemite National Park and who was accidentally shot and incapacitated for active duty in patrol, has been assigned to employment in the office of Forest Superintendent C. S. Newhall.



ARTHUR POWELL DAVIS,

SUPERVISING ENGINEER OF THE U. S. RECLAMATION SERVICE.

ARTHUR POWELL DAVIS was born at Decatur, Ill., February 9, 1861, the son of John and Martha P. Davis. He was educated at the Junction City (Kans.) High School, afterward graduated at the State Normal School, Emporia, Kans., and still later studied engineering subjects at Columbian University, Washington, D. C. From 1884 to 1894 he was a topographer in the Geological Survey, conducting surveys and explorations in Arizona, New Mexico, and California. From 1895 to 1897 he was a hydrographer in charge of government stream measurements, and has been in charge of the hydrographic examination of the Nicaragua and Panama Canal routes since 1898.

While Mr. Davis has been closely identified with the reclamation work as a whole, his efforts in connection with the Tonto Basin project in the Salt River Valley, Arizona, have attracted wide attention, as it is an extremely interesting piece of work, both from an engineering and economic standpoint. His present high position has been attained at an early age, which assures the country his services for many years to come.

Both by training and inclination Mr. Davis is well fitted for a leading part in the great work of government reclamation of arid lands, which is now well under way. He is of that type of men which have built up the U. S. Geological Survey into what has come to be very generally considered the most effective bureau in the government. For the last twenty years, during which the Survey has made its greatest advances, Mr. Davis has been in its service continuously.

REPORT OF PUBLIC LANDS COMMISSION.

A PRELIMINARY STATEMENT, WHICH CONTAINS RECOMMENDATIONS FOR CHANGES IN THE EXISTING LAND LAWS—TRANSMITTED TO CONGRESS WITH THE PRESIDENT'S LETTER OF APPROVAL, MARCH 7, 1904.

To His Excellency Theodore Roosevelt, President of the United States.

SIR: This Commission, appointed October 22, 1903, to report to you upon the condition, operation, and effect of the present land laws, and to recommend such changes as are needed to effect the largest practicable disposition of the public lands to actual settlers who will build permanent homes upon them, and to secure in permanence the fullest and most effective use of the resources of the public lands, respectfully submits the following partial report:

MEETINGS OF COMMISSION.

During the month of December, 1903, the Commission sat in the office of the Commissioner of the General Land Office to receive recommendations and hear the arguments of all who might appear before it. Notice of these sittings was published through the press and special invitations to be present were extended to the Public Lands Committees of the Congress. Senators and Representatives and others appeared before the Commission.

In January, 1904, Messrs. Pinchot and Newell, of the Commission, attended the meetings of the National Livestock Association and of the National Woolgrowers' Association in Portland, Oreg., and participated in the sessions of those associations. Returning, they also visited Sacramento, Cal.; Reno, Nev.; Salt Lake City, Utah; Denver, Colo.; Cheyenne, Wyo., and conferred with governors, state land boards, public officials, and citizens generally, and discussed the questions under consideration by the Commission. Upon the return of Messrs. Pinchot and Newell to Washington the meetings of the Commission were resumed.

ANTIQUATED LAND LAWS.

The information obtained by the Commission through the conferences in the West and the hearings in Washington discloses a prevailing opinion that the present land laws do not fit the conditions of the remaining public lands. Most of these laws and the departmental practices which have grown up under them were framed to suit the lands of the humid region. The public lands which now remain are chiefly arid in character. Hence these laws and practices are no longer well suited for the most economical and effective disposal of lands to actual settlers.

TIMBER AND STONE ACT.

Under the act of June 3, 1878, generally known as the Timber and Stone Act, there has lately been an unusual increase in the number of entries, which can not be accounted for by an increase in the demands of commerce or by any unusual settlement of the localities in which the greater part of the entries were made. In 1902 there were 4,022 entries under this act, aggregating 545,253 acres, while in 1903 there were 12,249 such entries, aggregating 1,765,222 acres. A very large proportion of these entries were upon timbered land. The law was enacted to meet the demands of settlers, miners, and others for timber and stone for building, mining, and other purposes. There is much evidence, however, going to show that many entries have been made for purposes not contemplated by the Congress.

Under this law no residence upon nor cultivation of the tract entered is required. An application is made at the local land office in the district in which the land is situated to purchase 160 acres, or less, of land which it is alleged is chiefly valuable for the timber or stone, as the case may be, which it contains. Advertisement is made for sixty days, naming a date upon which evidence will be offered before the local land officers to prove the character of the land. Upon

the day named such proof is offered, and, if deemed sufficient and there being no protest nor allegation of fraud or collusion, payment at the rate of $2.50 per acre is made and final receipt is issued. This practically concludes the transaction, the issuing of the patent following in due course of time.

The only grounds upon which the entry by a qualified entryman would be refused are either that the land is not chiefly valuable for timber or stone, or that entry is not being made for the sole use and benefit of the entryman, but for speculative purposes. As the entries under this act are generally made for the timber which the land contains, proof is seldom lacking that the land is chiefly valuable for timber. It is very difficult to prove collusion or that the entry was made for speculative purposes, although it is apparent that many such entries have been made.

In the case of United States *v.* Budd (144 U. S., 154), in a decision made in March, 1892, the United States Supreme Court said (syllabus quoted):

(1) That all the act of June 3, 1878, denounces is a prior agreement by which the patentee acts for another in the purchase.

(2) That M. might rightfully go or send into that vicinity (the vicinity of the land) and make known generally to individuals a willingness to buy timber land at a price in excess of that which it would cost to obtain it from the government, and that a person knowing of that offer might rightfully go to the land office and purchase a timber lot from the government and transfer it to M. for the stated excess without violating the act of June 3, 1878.

The Commission believes that Congress did not intend that this law should be used for the acquisition of large tracts of valuable timber land by individuals or corporations, but it has been used for such purposes. Carefulness and vigilance in its administration can not prevent its being so used. A great number of such entries were recently suspended, but the most rigid investigation failed to show that any considerable proportion of them had been made in violation of the law, and the suspensions were removed. The fact remains, however, that many of these entries were made by non-residents of the state in which the land is situated, who could not use the land nor the timber upon it themselves, and it is apparent that they were made for speculative purposes and will eventually follow the course taken by many previous similar entries and become part of some large timber holding.

While this law is adapted to and chiefly used for the acquisition of timber land, many entries have been made under it where it was alleged that the land is chiefly valuable for stone. There is no doubt that the land in a very large proportion of such entries was not desired on account of the stone which it contained, but for the purpose of obtaining control of water or to add to other holdings. There are, moreover, other laws under which land containing stone may be entered.

Our conclusion is that the law is defective, because even when properly administered it may be used for purposes for which it was never intended, and we recommend its repeal.

If the timber and stone act is repealed some legislative enactment will be necessary providing for acquiring timber upon the public lands. The manner in which timber upon Indian lands has recently been disposed of suggests a plan for the disposition of this timber upon the public lands. The timber is advertised and sold to the highest bidder, with the result that the market price has been obtained.

Some means should be provided by which the matured timber upon the unreserved public lands may be sold, not only for the use of individuals, but also to supply the demands of commerce. There is now a provision of law for the free use of timber in limited quantities for domestic and mining purposes which meets the requirements of those needing small quantities, but there is no provision for the sale of timber except from forest reserves.

RECOMMENDATION OF SALE OF TIMBER.

We recommend the enactment of a law under which it shall be lawful for the Secretary of the Interior to sell to the highest bidder, at public outcry or oth-

erwise, under such rules and regulations and subject to such conditions and restrictions and in such quantities as he may prescribe, the right to cut and remove, within such period of time as he may fix, any timber from any unappropriated, nonmineral, surveyed public lands, after first having had such timber duly appraised, and after giving public notice of the time, terms, manner, and place of such sale; that he shall have power and authority to reject any and all bids offered at any such sale, and that it shall be unlawful for any purchaser at such sale to sell, transfer, assign, or in any manner alienate the rights secured by him under this act, except as authorized by said Secretary; that the act entitled "An act for the sale of timber lands in the States of California, Oregon, Nevada, and Washington Territory," approved June 3, 1878, and all acts amendatory thereof be repealed, and that no lands valuable chiefly for timber shall hereafter be patented under the commutation provisions of the homestead laws; that any person who violates any of these provisions, or any regulation or requirement prescribed pursuant thereto, shall forfeit to the United States all benefits conferred and all moneys paid by him, and that any right to cut and remove timber which he may then hold shall be canceled and revoked.

COMMUTATION CLAUSE OF THE HOMESTEAD ACT.

Much evidence has been submitted tending to show that in the prairie states, where it has been most used, the commutation clause of the Homestead Act has been of advantage to the settler without causing serious loss to the government. On the contrary, the government has been pecuniarily benefited by it, because under this act the land is paid for in cash after fourteen months' residence, while without commutation the entryman would receive a patent after five years' residence without paying for the land. It is no doubt true that the great majority of commutations are made in order to get a title to the land, upon which money could be borrowed for its improvement.

There have been abuses of this law as of other land laws, but principally in connection with entries made upon timber lands. It has furnished a convenient means by which an individual could obtain title to 160 acres of valuable timber land which could be readily sold for more than it had cost. In this way large holdings have been acquired.

The timbered areas of the public lands of to-day are generally in mountainous regions, and are not susceptible of a high state of cultivation after being cleared of timber. Entries of such land are seldom made for farming purposes, but if it is desired to do so the settler is permitted, under the law and regulations, to sell any surplus timber upon his claim, the proceeds of which can be used in its improvement. This is a source of revenue available immediately after entry and one which is not enjoyed by the settler upon prairie land.

Our investigations respecting the operations of the commutation clause are still in progress, and we are not prepared at this time to recommend its repeal. We are, however, satisfied that no serious hardship will be imposed upon the actual settler by prohibiting the patenting, under its provisions, of lands chiefly valuable for timber.

DESERT-LAND LAW.

The Commission is of the opinion that the Desert-Land Law should, for the present at least, be allowed to stand, with a few changes in detail. With the experience of the past for guidance, it is possible to enforce this law so that its essential provisions shall be complied with. When this is done it is evident that the entryman will have earned a patent at an expense too great for speculative purposes.

The number of entries is not so large as to preclude actual inspection of each by an agent of the government before final proof is accepted, and the required expenditures for reclamation are of such a character as to be easily ascertained. Especial attention should be directed to the proof that an adequate and permanent water supply has been provided.

There is one defect in this act which should be remedied at once. The act of

March 3, 1891 (26 Stat., 1095), permits the assignment of entries, and to invalidate an entry the illegal intent must assume some tangible form prior to entry. The mere fact that a contract to sell is made after the entry, or any other arrangement whereby the lands are held for some other person, does not warrant cancellation. This feature of the law is the chief objection that might be urged against it.

The right to assign an entry is not in harmony with the fundamental principle underlying the public-land laws that entries should be made for the exclusive benefit of the entryman and not for the benefit of any other person, and its existence practically abrogates the restriction of the act limiting one person to one entry in a compact form, the only actual limitation being to 320 acres, which might embrace a number of noncontiguous tracts taken by assignment.

The interest of the government and of the actual settler will be protected and promoted by a repeal of so much of the act of March 3, 1891, as permits the assignment of desert-land entries.

AGRICULTURAL LAND IN FOREST RESERVES.

However carefully the boundaries of forest reserves may be selected, it is practically inevitable that more or less agricultural land should be included. Such land usually lies in the narrow valleys of the rivers. Its occupation for agricultural purposes is in the interest of the region in which it lies and of the settlers who would make homes upon it. The presence of the latter in the reserves would, under wise laws, operate distinctly for the protection and general advantage of the reserves. It is essential to the prosperity of the public-land states both that the forest reserves should be maintained and that all of the land within their borders should be put to its best use. To exclude all agricultural lands by Presidential proclamation is not feasible, because of their small area, scattered location, and irregular boundaries. Therefore we recommend that such lands be opened to agricultural entry in the following way:

That the Secretary having supervision of forest reserves may, upon application, or otherwise, ascertain, list, and describe, by metes and bounds or otherwise, lands within such reserves which are chiefly valuable for agriculture, and that the lands so listed may, at the expiration of ninety days from the filing of such lists in the land office of the land district in which they are situated, be disposed of to actual settlers under the homestead laws only, in tracts not exceeding 160 acres in area and not exceeding 1½ miles in length; that when such lands are ascertained and listed upon the application of any person qualified to make homestead entry, such applicant may settle upon and enter such lands thirty days after the date of such filing; that no person settling upon, entering, or occupying such lands shall thereby have a right to use any other lands within such reserve for grazing or other purposes; that any entryman desiring to obtain patent to any lands, described by metes and bounds, entered by him under the provisions of this act, may do so by filing, with the required proof of residence and cultivation, a plat and field notes of the lands entered, made by or under the direction of the United States surveyor general, showing accurately the boundaries of such lands, which shall be distinctly marked by monuments on the ground, and shall post a copy of such plat, together with a notice of the time and place of offering proof, in a conspicuous place on the land embraced in such plat during the period prescribed for the publication of his notice of intention to offer proof, and that a copy of such plat and field notes shall also be kept posted in the office of the register of the land office for the land district in which such lands are situated for a like period; and, further, that any agricultural lands within forest reserves may, at the discretion of the Secretary, be surveyed by metes and bounds, but that no lands entered under these provisions shall be patented under the commutation provisions of the Homestead Laws or be exchanged for other public lands.

To open the reserves to homestead entry without restriction would be in effect to abolish them. We therefore

recommend that the agricultural character of the lands should be officially ascertained, as has been the habit hitherto in the case of agricultural and mineral lands.

The effect of the foregoing provisions is to give an intending settler the right to apply for the particular agricultural land he wants and sixty days' preference in entering it. Through survey by metes and bounds the settler is enabled to take the full amount of 160 acres of actual agricultural land. The principal danger in the administration of this plan is likely to arise from the desire of others than actual settlers to get possession of valuable timber lands on the plea that they are agricultural in character, to cut the timber from the lands, and then abandon them, to the serious injury of the interests which the reserves are created to serve.

Such an abuse would be greatly facilitated by the commutation clause of the Homestead Act, whereas actual settlers on agricultural lands in forest reserves would seldom or never suffer hardship from the requirement of five years' residence. Agricultural lands in forest reserves are not wholly on the same plane as such lands outside, because their use must be subservient to the purposes for which the reserves were created. Their actual occupation by permanent settlers is of the first importance to this object, and shifting of ownership during the first years of settlement and development would be of serious injury to the reserves. We are of the opinion that to allow the application of the commutation clause of the Homestead Act to lands in the forest reserves would tend to defeat the object of the opening of these lands to agricultural entry and would embarrass the administration of the reserves.

LANDS RELEASED FROM TEMPORARY WITHDRAWAL.

In making forest reserves it is usually necessary to withdraw temporarily, pending segregation, considerable areas of land which are known to contain forest growth. These temporary withdrawals are made usually of areas larger than will ultimately be proclaimed as forest reserves, in order to enable the officers of the government to ascertain what are the existing conditions and to draw the boundaries with care and without interference growing out of speculative entries or selections made not for settlement, but to secure certain advantages which may grow out of the creation of the forest reserve. For this reason temporary withdrawals are essential for the careful delimiting of the forest reserve. When the limits of a forest reserve are determined upon, the excluded lands are restored to entry and settlement.

Experience has shown that speculative entries or large filings of so-called scrip are frequently made upon such excluded land, to the detriment of actual settlers. Therefore provisions should be made to give actual settlers ample time in which to exercise their rights. Accordingly, the Commission recommends that in the event of the modification or revocation of any order temporarily withdrawing lands from settlement and entry resulting in the release of such lands from such withdrawal, or in the event of the exclusion or release of lands from any forest reserve established by the President, under section 24 of the act approved March 3, 1891, entitled "An act to repeal timber-culture laws, and for other purposes," the non-mineral public lands so released from a forest reserve, and not otherwise appropriated or reserved, shall become subject to settlement from the date of the order or proclamation so releasing or excluding them, but shall not become subject to entry, filing, or selection under any law providing for the disposal of non-mineral public lands until after sixty days' notice by such publication as the Secretary of the Interior may prescribe, nor shall they become subject to entry, filing, or selection under any law except the homestead laws until ninety days after said notice.

The Commission will continue its investigations and make further report.

Respectfully submitted.

W. A. RICHARDS.
F. H. NEWELL.
GIFFORD PINCHOT.

THE DRIVE.

HOW LUMBERMEN EMPLOY THE POWER OF THE SPRING FRESHET, DAMS, AND DYNAMITE, IN FLOATING THE FOREST CROP TO THE MILL.

BY

ROBERT V. R. REYNOLDS.

ALL through the winter months the sturdy northern lumberjacks have been at work hauling the logs from the cuttings, and unloading them down upon the frozen streams and lakes, and along their banks.

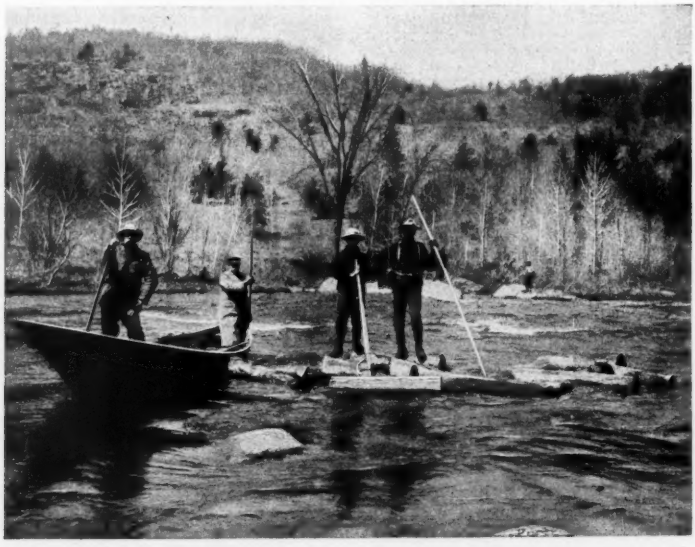
At the "banking" places on the streams the sleds have left thousands of tons of logs, which have been piled in long rollways across the ice and upon the banks as far as they could be conveniently handled by rolling them one over another. On the banks themselves for a long distance is a succession of skids side by side, sloping toward the water and piled high with logs. Barring accidents, the entire cut of the early winter has been transported to the waterways before the relaxing grip of winter allows any serious damage to the winter roads.

A few days of inaction may intervene between the last of the hauling and the beginning of the drive. The horses are sent out to the settled country before the swamps become impassable, pike-poles and peavies are repaired, and the lower camps are redolent of tallow as last year's driving shoes are searched out of winter storage, fitted with their complement of spikes, and soft ened with melted grease. Overalls are "stagged," or cut off just below the knee, and long woolen stockings worn.

LOGS ON THE ICE, JUST BEFORE THE SPRING FRESHET.

Through the courtesy of the Bureau of Forestry, U. S. Department of Agriculture, we are enabled to present the accompanying illustrations.—EDITOR.

Some of the men go thus all the year round, but it is particularly the dress of the driver, whose life depends on agility. The boats, which were poled upstream or hauled in during the fall, are overhauled, calked, and soaked tight. They are long, flat-bottomed, double-ended bateaus, with plenty of sheer and sides that tumble home sharply, something like a dory. Enough of them are supplied to carry the whole crew when necessary. Also there has been built a craft called the "wanigan" (Indian *wangan* = bait), larger, and constructed solidly enough to endure rough work among logs and ice; a floating kitchen and storehouse on the plan of a narrow houseboat.



DRIVERS AND BATEAU (ADIRONDACKS).

Every day the sun mounts a little higher in the heavens. Its warm rays penetrate the forest canopy and daily operate with greater power on the snow-clad hillsides. At the beginning of February the snow lay possibly three to seven feet deep, according to the severity of the winter. Now all this great mass of stored water is being released, and taking its way down every little runlet to the rivers on its way to the ocean. During the end of March or the beginning of April the first warm spring days come, and the snow disappears rapidly. For twenty-four hours a warm heavy rain falls. The brooks overflow their banks and the river is no longer able to carry off the increasing volume of water, and rises rapidly. The weakened ice gives way under the tremendous strains imposed upon it. The heavy piles of logs crush through and spread, and the great mass slowly plows its way downstream through the rotten ice, driven by the resistless thrust of the swelling flood behind.

As soon as possible the logs are picked apart and strung out, in order to avoid a jam at some point below. Everything must be done without delay now, for the flood rises and falls rapidly on the large streams, and advantage must be taken of the upper stage to get the drive safely past the troublesome places. All the huge rollways of logs on the banks of the river are successively launched into the stream as soon as those which were on the ice have moved out of the way. The piles may be 30 feet or more in height and very steep on the side toward the river. The men work in most dangerous positions at the foot of the poised

logs, wrenching and prying at those which hold back the rest.

Suddenly they give way, and the larger part of the towering mass avalanches with a roar into the water. Every log is launched and sent spinning downstream. Some of the men go with the main body of the logs, riding them as surely and fearlessly as circus performers tread the backs of running horses. Their "cork boots" prevent them from slipping, and their pike poles are used in maintaining their balance. They run about on the rolling, swinging logs with the activity of cats, pushing here, pulling there, always keeping the mass of timbers from becoming too compact or turning across the current, so as to be liable to catch on a snag or rock. The heart of one who sees them thus for the first time is constantly in his throat with apprehension, for every minute they appear to be in imminent danger of death by drowning or crushing.

It may be that they are not averse to a little display of their skill and hardihood at the times when anxious spectators are observed upon the banks. Westerners say that their bronco-busters will let a bad horse do his worst on hard ground if a woman chances to be looking on, while in the ordinary course of affairs they would tie one forefoot up to the saddle-horn and conquer the beast on a soft spot in a corral. Professional pride is a strong point with these gentlemen of strenuous lives.

A part of the crew follows behind, gathering in the stragglers. The freshet is liable to rise over the river banks, in which case many logs float into thickets on low ground or are detained in side ravines or in eddies. All of these must be returned to the stream, and this work entails a great deal of heavy lifting, and not infrequent wading hip-deep for hours in the icy water. When a man becomes numbed he takes a run on shore or stands on a log while his fellows beat circulation into his limbs. Occasionally one slips or stumbles and takes an involuntary bath among the logs and floating ice. This is the signal for a roar of laughter and much merciless chaff from the more fortunate. The rest of the day he must work in sodden clothing. A cold, wet shirt discourages loafing, to say the least.

Under such conditions the average man would expect nothing less than pneumonia, but the rivermen are seldom troubled with sickness of any kind.

LOGS RUNNING FREELY IN FLOODED STREAM (ADIRONDACKS).

In fact, the case is quoted of one man who could not sleep at home in his bed on account of asthma, but who suffered no inconvenience when working all day in the water and sleeping under thin blankets on the river shore. Upon returning to his home after the drive he immediately caught a violent cold. However, it can not be claimed that this work is really beneficial to the system in the long run. Many old river drivers suffer greatly from rheumatism as an after effect of exposure in youthful days.

The boats and the wanigan go along with the drive. The commissary, like that of an army, is the most vital point of the drive, and the cook and his helpers are kept very busy indeed. The cook is the best-paid man in the company, excepting only the foreman, and by virtue of his prerogatives is somewhat of a despot. Certainly the cook's disposition and ability have much to do with the success of any such campaign.

During the drive four meals a day are none too much for the ravenous drivers, who eat heartily at 5 a. m., again at 10, then at 2 p. m., and finally at 8 in the evening.

After the two o'clock meal the wanigan casts loose and navigates downstream as far as it is thought the men can bring the drive that night. The evening meal is ready on time, and the wanigan lies moored to the bank, with a lantern hung out to show the hungry men which way to go if their keen noses can not tell them. Do you know just how good coffee can smell under such circumstances?

They sleep ashore on beds of balsam boughs, around great camp-fires, with their wet clothing steaming where it hangs at a safe distance from the heat. Wet boots are kept carefully away from the fire, for the least overheating ruins a wet greased boot with marvelous quickness. The leather fries into a shriveled, brittle substance, which flies into fragments at the first attempt to force a foot inside it.

Where the streams are large, or in lake work, things are done a little differently, and a floating bunk-house is usually provided, which is much preferable to a couch among the rocks in the rain.

Wherever they sleep, they never know at what hour of the night they may be roused and sent out on the stream on account of a sudden change in the volume of water running and the consequent probability of a bad jam or other trouble. Hours before daylight they are afoot and on their way back to the rear. They may be able to run it down as far as the wanigan by breakfast time, and an hour saved may mean all the difference between success and failure when a falling stream must be contended with.

Where the logs are hauled onto a lake they are piled as compactly as possible, and a great boom of logs, chained end to end, is built around them. When the ice goes out the boom is there to prevent them from scattering and make their handling less difficult. In the old days a boom full of logs would be warped along through a chain of lakes by carrying an anchor far ahead and then hauling the boom to the anchor by means of a capstan mounted on a raft. Sometimes a sail was employed when the wind favored. A more usual means nowadays is to build a boom more than long enough to reach across the lake at its widest part. Beginning at the upper end of the lake, one end of the boom is fastened to a point on the shore and the other end is dragged ahead along the opposite shore by a small steam tug as far as it will reach and fastened in turn. The opposite end is then advanced similarly, and in this manner all the logs are swept through the lake.

The logs of several companies may become mingled, as on account of a jam or hard luck one drive may overtake another. This makes no difference, unless the crews take a dislike to each other and make mischief. Otherwise they will work together for the good of all, and the logs are sorted out at the end of the drive by means of the owners' marks—curious hieroglyphics cut in the bark or stamped into the ends, or both.

Unless the stream is unusually deep and well adapted for driving, it has been provided with a number of "splash dams," built of logs and hewn timbers,

SLUICEWAYS OF A SPLASH DAM (MINNESOTA).

which operate on the same principle as the locks of a canal, by backing the water up on rapids and other shallow parts of the river, and thus aiding in floating the logs down from the upper levels and sending them on with a rush when the gates are opened.

Above the dams long booms converge from the shores to the entrance of the sloping sluiceway, through which the water and logs must pass. When the gate is open a smooth, black body of water rushes down the sluiceway, dashing itself into foam in the rapids below. Four or five men work along the booms, directing the logs into the current as fast as they come down the stream.

They will mount a log at the upper end of the boom and ride with the utmost *sang froid* down the quickening current, changing to another log or stepping nonchalantly to safety on the boom again, just as the unwieldy craft tips up in the slope of the sluiceway. The log darts ahead in the grip of the current, and three seconds later above the roar of the water you hear the jarring shock of its impact upon the rocks in the bed of the stream. Later you see it reappear, buoyant as cork, in the swirl of the rapids far downstream. The wanigan likewise must run the gauntlet of the sluiceways.

The life of the river driver is full of strain and exposure, and the only thing that guards him is his own brawn and brain, well coördinated and backed by steady courage. At any time he may be called upon to risk limb or life to save his employer's property or the life of a comrade in peril.

The time of greatest danger is in working on the jams, which will form in spite of the skill and faithful work of the crews. Shutting off too much of the flow from a dam at a time when the stream is full of logs will crowd the logs together, upending some on the shallows and delaying progress until the pressure of the constantly accumulating timbers in the rear locks the whole mass like a tangle of Titanic jackstraws. (See frontispiece.) The narrow, rocky channels of a rapid, or a crook in a gorge may have the same effect, and the pent-up force of the water behind piles the logs high in air.

Frequently the whole situation depends upon one or two "key-logs," which control all the rest. The men run nimbly over the big brown sticks and under the very face of the jam, which

hangs over their heads like a beetling cliff. Prying and twisting with their peavies, they detect the key-log by its position and its tension and rigidity under the tremendous strain from the rear. They may pry it loose, or cut it out with axe or saw, or blow it out with dynamite, depending on the obstinacy of the jam and the amount of danger attendant. The jam is a treacherous thing. It may shift of itself and melt away without a moment's warning, or it may hang for weeks, defying skill and dynamite. Sometimes at the first blow of the axe on the key-log the overstrained stick parts instantly, and the whole jam leaps forward at once, taxing every resource of the men to escape destruction.

Again, they may succeed repeatedly in starting the tangle, and each time be disappointed to see it lock fast more hopelessly than before. Patiently they pick out single logs from along the shores and set them adrift, working their way upstream and leaving a narrow body of logs in the middle, extending from the key-log to the body of the jam. Then the dams are opened at full head, with the hope that the sudden impact will crumble up the resistance and force everything past the obstacle.

If the jam is in a gorge the men are lowered from the cliffs by ropes to do their work, in order that they may be hauled out of harm's way the instant the mass begins to move, since they can have no other avenue of escape.

Thus, day after day and week after week they work their way downstream until the last rapid is negotiated safely, and the last bend of the river passed, and the sorting gap comes into sight, with the white smoke floating lazily up in the spring sunshine from the burners at the mills below. The drive is in and everybody is happy, not excepting the owners.

The sorting gap is a kind of clearing house for logs. The several drives are held in one great boom, from which the desired quantity can be released as needed daily at the various mills. Other booms extend downstream in such fashion that as a log comes along and is recognized by its marks it is guided by men armed with pike-poles into the entrance which will take it to the owner's mill. If a mistake is made the scaler

THE SORTING GAP (MICHIGAN).

SCENE ON MENOMINEE RIVER AT MARINETTE, WIS. FORMERLY FOR A NUMBER OF YEARS SEVEN HUNDRED MILLION FEET OF PINE WAS DRIVEN DOWN THIS STREAM EACH SPRING.

at the mill is supposed to detect it and credit the proper firm.

In the old days solid citizens were accustomed to feel uneasy for several days after the drive came in. Such a visitation has been known to result in the entire demolition of a thriving young town. It was no light matter, this sudden arrival of scores of hardy, resolute men, with enormous appetites, unquenchable thirsts, five months of pent-up enthusiasm, and a winter's pay in possession. The police smiled indulgently when capers were cut, their organization being the result of a process of natural selection. Such of their number as had declined to smile on previous occasions became unable to act longer as police. Some of them were unable even to smile.

Today the drivers do not "take the town apart" quite as freely as formerly, but the arrival of the drive is still an event of the year. The drivers are popular with several classes of the people, and they know it. Not only does their unspent pay account for part of their cordial reception, but the young women seem to approve of them as men returned from a hard-fought campaign, and they are the heroes of boyhood in sawmill towns. Every youngster's ambition is to "birl" (*i. e.*, cause a floating log to revolve by treading it) as the local champion does, and to that end he stags off his overalls and practices slyly, at the imminent risk of drowning, where the big sticks lie in the ponds at the sawmills. Their fathers and elder brothers trained in the same school.

REPORT OF THE FORESTER FOR 1903.

WORK OF THE BUREAU OF FORESTRY.
ITS OPPORTUNITIES AND ITS NEEDS.

THE annual report of Mr. Gifford Pinchot, Forester of the Department of Agriculture, is a brief document, but one of unusual interest to the public, if one may judge by the reviews and comments which have appeared in the press of all parts of the country.

Prefacing the body of the report, which is a condensed description of the work accomplished by each of the various sections during the year previous to July 1, 1903, Mr. Pinchot makes these significant statements, showing the rapidly increasing influence and responsibility of the Bureau of Forestry and the need of increased means and experienced men to accomplish its ever-growing tasks, so essential to the future welfare of the nation:

"No previous year has seen such progress in forestry as the last. During this time public sentiment in favor of forestry became more marked, and practical forest work in the woods was better in quality and greater in amount than ever before. But great though the progress was in comparison with other years, actually it was small. The saving of the forests by wise use is but little nearer than it was a year ago, except for the wider spread of a knowledge of the nature and objects of forestry. The means available are yet too feeble to make much impression on the gigantic task of preventing the destruction of the lumber industry, the fourth among the great industries of the United States, and of using conservatively the forests which supply wood and conserve water for the use of the nation. The interests which these supplies serve and maintain are so vital to all our people that it can not be in question whether they shall be preserved, but only how best it can be done. The present provisions are wholly insufficient.

"The very rapid progress of the sentiment for forest preservation during the last year has been nowhere more conspicuous than in the Western States. The greater part of it may be traced directly to the growing desire for development in irrigation which followed the passage of the national reclamation law. Except where special interests complicate and obscure the issue, the public opinion of the West has become unanimous in favor of forest preservation for the protection of the water supply, and practically so for the perpetuation of the supply of timber.

"The necessity for the creation of forest reserves for their influence on the stream flow and timber supply is being better understood and is steadily receiving greater support where once there was opposition to the policy. The people of the West have not only come to understand that existing forests must be preserved if irrigation is to maintain its continued development, but they are realizing also the importance of reserving lands once covered with forest, but now denuded, and the essential necessity that the government should reclothe them with trees.

"Decidedly the most important development of the year in forestry has been the awakening of the great lumber interests to the necessity for practical forestry and the hearty coöperation they have begun to give to the efforts of the government for forest perpetuation. At the convention of the National Lumber Manufacturers' Association, held in Washington, more attention was given to forestry than to any other subject. The convention expressed itself in favor of the perpetuation of forests by wise use, and gave evidence of its good will by visiting the Bureau of Forestry in a body. Members of the association have since that time begun active coöperation with the Bureau with the object of forest preservation, and it may fairly be said that forestry has become a live issue in the minds of the great timber-land holders of the United States.

"Only less important is the recent tendency of the railroads of the United

States to consider the future of their timber supply and to take measures for its perpetuation. Railroads are among the greatest consumers of timber in the United States, and the preservation or destruction of vast areas of forest will depend on the attitude they assume toward this question, which is not less vital to them than to other users of wood.

"The growing tendency of the Bureau of Forestry to devote its energies rather to government work than to the assistance of private owners was marked during the past year. In spite of the rapidly increasing demand for assistance under the terms of Circular No. 21 on the part of private owners, a very large proportion of the work of the Bureau was given directly to government forest problems on public land. But the greater part of the forests of the United States are and doubtless will remain in private hands, and their preservation is essential to the national safety and prosperity. While, therefore, it is right that the Bureau of Forestry should meet first of all the demands for strictly government work, it can not neglect the requests for assistance from private owners without most seriously endangering the central object of its existence, which is the perpetuation of the forests of this country by wise use.

"The widening of the field for practical usefulness of the Bureau in coöperation with private owners was shown by the growing number and the eagerness of such demands. In meeting them it is the public rather than any private interest which is at stake. It is plain that a great opportunity has presented itself at a critical time. If this Bureau can be equipped to meet the demand before destruction has gone too far, the extensive protection of woodlands by the practice of forestry will certainly be attained. The only obstacle is present inability to handle the work. The Bureau is face to face with a situation with which it is unable to cope. Not only are the demands already made upon it far beyond its present capacity to meet, but there is grave danger that vast areas of the forests will have disappeared before the Bureau of Forestry can be made ready to use the opportunity to save them."

REMODELING NEW YORK'S FOREST POLICY

SITUATION AT ALBANY AND EXTRACTS FROM THE REPORT OF THE SPECIAL COMMITTEE OF THE SENATE ON THE FUTURE POLICY OF THE STATE IN RELATION TO THE ADIRONDACKS AND FOREST PRESERVATION.

THE present status of forest interests in New York State is a matter of speculation among those who desire to see the Adirondacks and the Catskill Mountain forests made safe, permanent, and profitable.

The extensive damage done by fires in these forests last spring has brought the question of the welfare of the state forests before the public with more prominence than ever before, and has resulted in the appointment of a special committee of the senate to investigate forest matters and make recommendations for changes in the present forest laws.

Several circumstances combine to render the enactment of a forest code satisfactory from the forester's point of view a very uncertain matter in New York.

There is a clause in the state constitution which forbids any cutting or removal of even dead wood from state lands, consequently throttling all silvicultural work except planting.

There is the uncertain attitude of Governor Odell, who vetoed the bill for maintenance of the State College of Forestry and interrupted the demonstration work in the Adirondacks, but whose last message seems to acknowledge very little reasonable ground for his action.

There are the powerful railroad companies, which naturally do not wish to

take expensive precautions unless driven to it.

There is the Legislature itself, many of whose members, ignorant of the processes of forestry and mindful of past jobbery, are extremely chary of voting for measures which have not been assured of success by trial in other states.

Until recently New York has been more progressive and far-sighted in forest matters than any of the other states. The creation of the Adirondack and Catskill Mountain Preserves was a long step in advance, but it must be followed by more progress if the work is to be kept abreast of that now inaugurated by California and New Hampshire.

Some of the more pertinent portions of the report of the Special Committee on Forest Policy read as follows:

To the Senate:

The special committee of the senate appointed to inquire and report upon the future policy of the state in relation to the Adirondacks and forest preservation respectfully report that they have had several hearings in the city of New York and in Albany which have been well attended, and after giving careful attention to the suggestions made and to matters of public record beg leave to submit the following report:

The total acreage of the Adirondack Park as now laid out is 3,226,144 acres, of which the state owns 1,163,414 acres. Private preserves contain 705,914 acres. The remaining 1,356,816 acres are owned by private persons and business corporations. To preserve existing forests on these lands and to reforest tracts that have been denuded by man or devastated by fire is the unanimous and earnest desire of the people of the state.

There is some diversity of opinion as to the best means of executing the public will in relation to this interest, but there are three measures of immediate and available relief which, in general outline at least, have the unanimous approval of our people. These are a resumption of the former state policy of acquiring further holdings of Adirondack lands by purchase, the establishment of a system of fire protection sufficiently effective to prevent great forest fires, and the reforesting of barren and denuded tracts.

PURCHASE OF LAND.

Ownership by the state is the most effective means of preservation. It is much easier for the state to regulate and control its own holdings than to influence private owners to institute rational forestry methods. Prejudice does not exist against state ownership, and its holdings are not subjected in so great a degree as private holding to the perils of incendiarism. It is in keeping with the policy of maintaining these forests in trust for the general good—for lumber and water supply, as a regulator of climate and rainfall, and as a health and pleasure resort of incomparable value.

Former investments by the state in these lands are, owing to the great rise in their value, worth vastly more than they cost, with interest added. While prices in the future will be higher, the scale of prices is sure to be an ascending one for an indefinite period, and purchases made within the next few years are likely to be as profitable as purchases hitherto made now are. Waste lands can be most easily acquired, but special effort should be directed toward the acquisition of tracts of exceptional value as a watershed or for their natural scenery, as wooded mountains and shores of lakes and rivers. The cost can be properly reduced by allowing reservations of mature soft wood to the seller, while the hard wood, which is of much slower growth and of less value, will remain. A definite policy of acquiring the entire Adirondack Park should be adopted and carried into execution within a reasonable time, due regard being had to the rights of private owners and special privileges extended to present owners who coöperate with the state in forest preservation.

FIRE PROTECTION.

The statement in the annual report of the Forest, Fish, and Game Commission shows the loss by fire in the Adirondack and Catskill forests during the year 1903 to be as follows:

Adirondack Forest Fires, 1903.

Total acres of forest land burned....	464,189
Total value of standing timber, logs, pulpwood, and buildings burned..	$846,082
Total number of days' labor employed in fighting fire.....	77,290

Catskill Forest Fires, 1903.

Total acres of forest land burned....	36,329
Total value of standing timber, pulpwood, etc., and buildings burned..	$37,034
Total number of days' labor.....	4,492

The cost to the state and to the towns in fighting fires will not be less than $185,000 for 1903, so that the total money loss from forest fires during that year will amount to more than $1,000,000. Owing to the vigilance and efficiency of the forest commission, only 12 per cent of the fires occurred on state lands, but the loss to private owners is directly injurious to public interests. Four hundred and sixty-five thousand acres were burned over during the year, and it is apparent that unless the recurrence of such a catastrophe can be prevented, all efforts toward forest preservation will be in vain. These fires occur only in years of exceptional drought. They are due to railroads, to burning fallows, to the carelessness of campers and fishermen, and to incendiaries. There was a general concurrence of opinion among those who appeared before the committee in attributing 50 per cent of these fires to railroads.

The railroads in the Adirondacks are: the Mohawk and Malone (N. Y. C. & H. R. R.), running through forest lands 127 miles from Forestport to Owls Head, and within the Adirondack park 91 miles from Otter Lake to Rainbow; The Carthage and Adirondack (N. Y. C. & H. R. R.), in forest lands in or near the park, 29 miles; the Racquette Lake (N. Y. C. & H. R. R.), 18 miles, wholly within the park; the New York and Ottawa, 49 miles in forest lands from Dickenson Center to Tupper Lake, and 29 miles within the park; the Chateaugay (D. & H.), from Chazy Lake to Lake Placid, 55 miles, of which 17 miles is in the park. A map showing the burned areas in the Adirondacks, prepared by the Bureau of Forestry at Washington, is made a part of this report through the courtesy of that department. It was verified before the committee by the testimony of the official who prepared it. From this map it appears that fires raged substantially throughout the entire length of each of these railroads, except the Racquette Lake Railroad. Of the 127 miles of the Mohawk and Malone, there was scarcely 15 miles free from extensive conflagrations on either side of its track. None of the other lines except the Racquette Lake is noticeably better, and one is distinctly worse. It is difficult after examining this map to credit 50 per cent of the fires to other causes than railroads.

From the testimony of the officials of the State Commission on Forestry, the Forest Department at Washington, and experts from Yale and Cornell Universities, the committee is satisfied that reasonable precautions would effectually prevent railroad fires. They are substantially unknown in European forests, notwithstanding equal exposure. Not a single fire occurred along the 18 miles of the Racquette Lake Railroad, where petroleum is used. While fires would not occur except for the use of coal, they are only set from engines burning coal by reason of gross carelessness and lack of reasonable precaution. The lack of reasonable precaution is further shown by insufficient fire patrol. General slackness is promoted by inadequate laws fixing the liability for fire damage and imposing official restraint and supervision for fire prevention. There is no reason why damage to the forests by fire occasioned by carelessness should not be collected equally with damages suffered by private owners in more settled sections. In fact, the obligation to the state to avoid damage in such cases is as much greater as the interest of the state and its people is greater in their own forests than in private lands. Legislation should be enacted requiring strict accountability in all such cases.

Expert opinion is unanimous to the effect that with reasonably efficient laws providing against careless or wanton fire setting, a system of fire patrol will prevent extensive conflagrations. Such a patrol should be established along railroads and in sections frequented by campers and fishermen. As the need of

this precaution exists only two months of the year, and in its full extent only in years of drought, the patrol should be organized as far as possible from the present force in the Forest, Fish and Game Commission, but with such additions as are absolutely required to make it effectual.

The interest on the amount of the losses from fire in forests during the year 1903 would be adequate to maintain for all time a fire patrol service at what are now exposed points. Regular stations for dumping fire-boxes should be established and strict regulations for their exclusive use enforced. The only true way to fight fires is to prevent them.

REFORESTING.

Closely related to fire prevention is reforesting. The dead timber and débris on denuded and burned lands are, in the absence of green timber, a standing menace from fire—a great menace in exceptionally dry seasons and a menace at all times. Such tracts burn over repeatedly until the débris is completely consumed. The tendency is for such areas to enlarge their borders, and every fire has an ill effect upon the soil. The only remedy is tree planting. Experiments already made by the Forest Department show this to be entirely practicable, the cost varying from three to five dollars per acre. If planted with soft woods, it will produce a forest cover furnishing all of the benefits of a forest except merchantable timber in from twenty to twenty-five years, and merchantable timber in from thirty to forty years. Under the terms of the forest amendment to the constitution as thus far construed, the state government is powerless to remove or disturb this dead timber and débris, even though necessary to enable it to plant young trees. An amendment should, in our judgment, be adopted so far modifying its terms as to permit the legislature to authorize the destruction or removal of the dead timber by the state itself through its own agencies and employés, and not by contract, for the purpose of reforestation.

FEDERAL AID.

The national government, perceiving that an intelligent public sentiment is an indispensable prerequisite to forest preservation, has adopted the policy of coöperating with the states in defining, classifying, and describing their forests with a view, first, to determining the best means of extending and improving the forest cover for its protective value; second, to preventing fires, and, third, to managing forests on common-sense financial principles. The Bureau of Forestry in the Department of Agriculture proposes to undertake this work in New York at the joint expense of the state and nation, and undertakes to do the work within two years. An appropriation of $10,000 the first year and $5,000 the second year is requested, and your committee recommend that the request be granted. Similar appropriations have already been made by the States of California and New Hampshire.

In making the foregoing recommendations, the committee is aware of the uncertainty and doubt, not to say suspicion, hitherto revealed in the public mind of any and all plans for the improvement and preservation of our forests based upon any modification of existing constitutional provisions. So long as great commercial interests desire forest products, and the ownership and exclusive possession of vast tracts is sought by wealthy persons as game preserves and forest parks, there will be need of a vigilant and powerful public sentiment to protect the public interest.

We are conscious that the measures proposed are not in any sense a solution of the problem of establishing a rational system of forestry which shall increase the natural forest growth as the cultivation of wild fields multiplies their natural products. We shall be content if measures can now be adopted to preserve what we have, and to undertake the reforestation of tracts recently devastated. Such a course will serve to create in the public mind an intelligent and discriminating acquaintance with the problems in hand, to prepare the way for the future development of forestry on public and private lands, which shall secure to the people of the state the benefits of abundant and flourishing forests.

We summarize our recommendations as follows:

First. The passage of an act definitely fixing the limits of the Adirondack Park so as to include the contiguous forests which the park was established to protect.

Second. A resumption of the state policy of purchase of lands in the forest preserve.

Third. The enactment of laws requiring adequate precautions against fire setting by steam engines, a stricter accountability in damages of all parties setting fires carelessly or wantonly, and the establishment of a system of fire patrol.

Fourth. The adoption and execution of a plan of reforestation of denuded state lands in the Forest Park.

Fifth. A constitutional amendment empowering the legislature to pass laws for the destruction or removal of dead timber and débris on burned areas through agencies and employés of the state, and not by contract, for the purpose of reforestation, and for the sale of lands owned by the state in forest-preserve counties outside of the park limits when unsuited for a forest preserve, and the application of the proceeds to the purchase of lands in the park.

Sixth. The passage of an act defining the boundaries of the Catskill Park.

Seventh. An appropriation of $10,000 this year and $5,000 next year, to be used with a like amount appropriated by the national government in defining, classifying, and describing the forests in the forest preserve.

As your special committee is identical with the Senate Committee on Forest, Fish, and Game, committee bills will be reported during this session to cover the recommendations made.

ELON R. BROWN,
WM. W. ARMSTRONG,
J. P. ALLDS,
FRANK J. LEFEVRE,
W. L. BROWN,
WM. TOWNSEND,
LUKE A. KEENAN,
Special Committee.

RECLAMATION OF SALT AND ALKALI LANDS.

SHOWING APPLICABILITY OF RECENT TRIALS OF SOIL-WASHING IN EGYPT TO SIMILAR PROBLEMS IN THE UNITED STATES. COMPILED FROM RECENT PUBLICATIONS

OF

THOMAS H. MEANS,

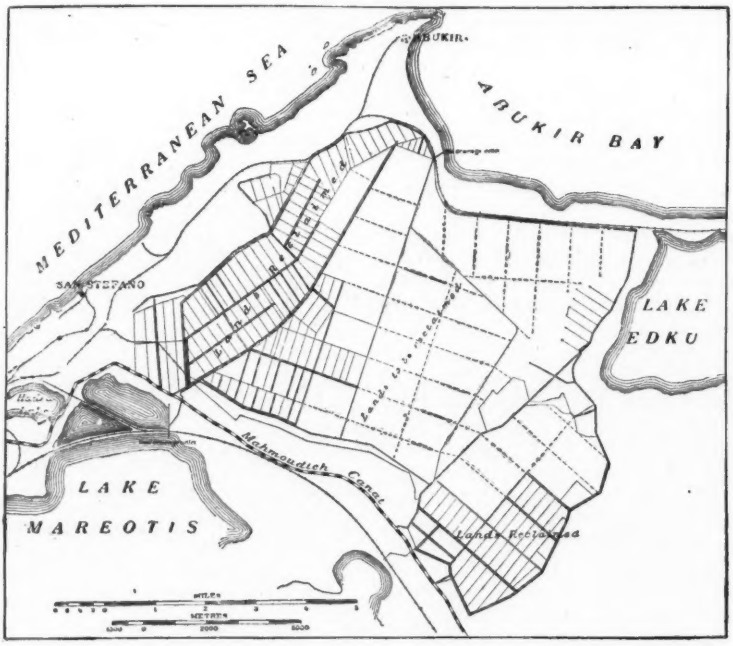
IN CHARGE OF ALKALI RECLAMATION, BUREAU OF SOILS.

THE soils of Egypt have been farmed for thousands of years. There are at the present time 6,250,000 acres of irrigated land, and it is supposed that under the Pharaohs a much larger area was under cultivation, for at the present time one-third of the irrigable land is uncultivated. At the time of the Arabian conquest, in the seventh century A. D., a large portion of Egypt was devastated, the banks of the old basins were broken, and large areas were flooded with salt water or left idle. The land thus abandoned was subject to evaporation from the surface, as a consequence of which over 1,500,000 acres of land have been so damaged by the rise of salt and alkali that their cultivation is no longer possible. These lands lie in a fringe around the lower edge of the Delta and extend from Alexandria to Suez.

For the use of the illustrations in this article we are indebted to the courtesy of the Bureau of Soils, U. S. Department of Agriculture.—EDITOR.

Except for those small areas of land lying too high to be reached by the ordinary floods of the Nile, the ancients used only the basin system of irrigation. This method consists of flooding the land to a depth of from 3 to 5 feet at the season of high Nile and of maintaining this depth of water for about six weeks, when the water is drained back into the Nile and the seed is sown, without plowing or other cultivation, on the surface of the newly deposited mud. In this way but one crop could be grown each year. The higher lands were covered only by the highest floods, or only eight or nine times in a century. During the remaining years these lands were irrigated by lifting the water from the canals or the river. It can readily be seen that there was little opportunity for the accumulation of alkali salts so long as the basin method of irrigation was kept up, for the large amount of water which washed over and through the soil each year either removed the salts or washed them down so deep that the capillary forces were unable to return them to the surface before the next annual flood. Upon the abandonment of this method, however, the movement of soil moisture was entirely from below, and the soluble salts gradually accumulated at the surface.

The first step toward reclamation is the construction of canals for irrigation and of ditches for underdrainage. Irrigation water is taken by a large canal, which subdivides and ramifies over the entire area to be irrigated. The drainage water is drawn off and discharged into a lake or the Mediterranean.



ABUKIR TRACT, WHICH IS BEING RECLAIMED FROM SALT.

The accompanying plans show two methods of placing the canals and drains, both of which are in general use.

By the first plan (Fig. 1) the secondary drains run half way between the secondary canals, and into them the tertiary drains or laterals run from each side. These tertiary ditches are 150 meters (492 feet) long, 80 centimeters (31½ inches) deep, 25 centimeters (9.8

inches) wide at the bottom, and 125 centimeters (49 inches) wide at the top. The distance between the drains is 50 meters (164 feet). These lateral drains subdivide the land into areas 150 by 50 meters (492 by 164 feet), containing about 1.83 acres. This tract is called a "gata" and is the unit used in renting the land.

The second plan (Fig. 2) shows the system of canals and drains in use in other parts of the reclamation work. The main difference between this and the first plan is that the secondary drains run beside the secondary canals and serve as infiltration drains to catch the water which seeps from these canals. The tertiary drains are 300 meters long.

In this plan a smaller amount of ditching is necessary, and where there it enough slope to permit the use of such long drains, this system is to be recommended.

The land is so level that little fall can be had. The main drains and canals have a fall of about 1 in 20,000, or 3⅛ inches to the mile. The laterals and sublaterals are almost level.

The cost of this canalization is about $12.50 per acre. This includes also general expenses and cost of pumping plant.

LEVELING THE LAND.

One of the most essential parts of the reclamation system is the leveling of the land so that each field or "gata" will be perfectly level, and when flooded uniformly covered. There are two methods of leveling in use at Abukir. The first method is to use scrapers drawn by bullocks or buffaloes. These scrapers are very similar to the common scoop scraper in use in this country, but are of wood braced and protected by iron bands and with an iron cutting edge. Work with these is slow and laborious, but where labor is as cheap as in Egypt, and where it is so difficult to teach the natives to handle improved machinery, these home-made scrapers have proved very successful.

FIRST STEP IN RECLAMATION. DITCHING ALKALI LAND.

The second method of leveling is that of leveling under water by drawing a long board, on which the driver stands, across the field, while it is flooded with water to a depth of 3 or 4 inches. This method is cheaper than the first method, but can not be used the first year the land is flooded, because the soil is then very soft and boggy.

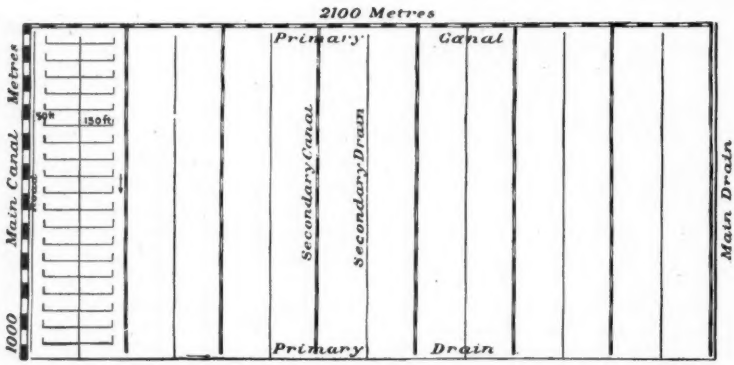


FIG. 1.—FIRST PLAN OF DRAIN ARRANGEMENT.

FLOODING THE LANDS.

After the canals and drains are dug and the land is sufficiently level to permit uniform flooding, water is turned into each gata to a depth of 4 inches. When possible this depth is maintained until the land is ready for a crop, but during the season of low water in the Nile the use of water for reclamation purposes is not permitted, so that there are times during the year when this land has to remain dry.

During the time the water remains upon the land the salt which the soil contains is dissolved and carried away by the drainage water. The drainage water is very salt and is said to contain at times over 10 per cent of sodium chloride.

On some of the land one season's washing is sufficient, but as a rule the land is washed two years before the soil is sweetened sufficiently to permit crop growth. If the first season's washing has not sufficiently sweetened the land, it is plowed during the summer months, when water is not abundant, in order to reduce the surface evaporation to a minimum.

At the end of the second year the land is usually sufficiently sweetened for some crop. Samples of the soil are examined for the percentage of sodium chloride content, as experience has shown that this is an indicator of the condition of the land as regards crop growth. The first crop to be grown is barnyard grass (*Panicum crus-galli*), called by the natives "dineba." The seed of this plant is obtained from the screenings from the rice mills, and as it is a by-product it is very cheap. If the growth of this grass is good, the

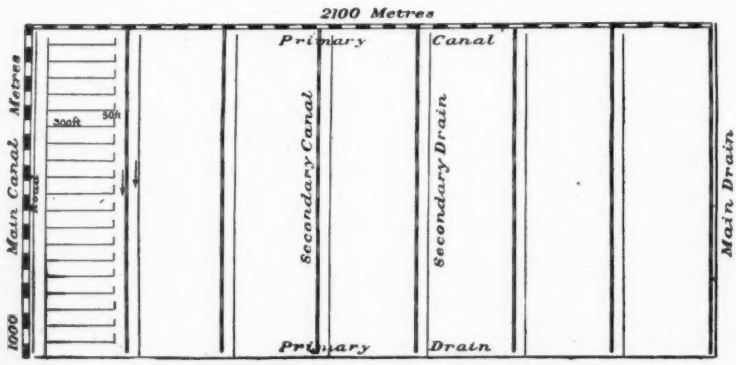


FIG. 2.—SECOND PLAN OF DRAIN ARRANGEMENT.

soil is considered in a condition for the introduction of other crops, and as a rule Egyptian clover is then planted. While these crops are on the ground the land is heavily flooded, as much water being used as the plants will stand, so that there is no opportunity for the alkali that has been washed down to return to the surface.

From all the information which could be gathered, it seems that the value of barnyard grass and Egyptian clover as reclamation crops is not due to the fact that they are able to withstand a large amount of salt, but to the fact that they are very shallow-rooted, growing in the immediate surface soil which has been washed free from salt, and are adapted to a very wet soil. Egyptian cotton, however, is a deep-rooted crop, its roots growing down into the subsoil, which is still charged with salt. Therefore the Egyptian cotton is actually more resistant to salt than the other two reclamation crops, though the best grades of cotton are not produced on salt lands.

The total cost of this reclamation work is given as $18.30 per acre, but it varies from this amount up to $25 or $30 per acre. This latter amount, however, includes the cost of the original purchase of the land, cost of live stock, tools, buildings, taxes, water distribution, management, seed, harvesting, and all expenses incident to the work. It will be seen that the greater part of these expenses would be incurred in taking up new land anywhere, and should not be included in the cost of actual reclamation from salt. It is very difficult to obtain figures as to the actual cost of ditching, washing, and farming until the land can be made to pay expenses and a reasonable interest on the capital invested, but it is thought that this figure does not exceed $15 per acre.

It should be remembered that the cost of labor in Egypt is very low. The ordinary farm laborer receives $5 per month, and labor by the day is paid 10 or 15 cents. Women and children take part in the minor field operations and receive from 3 to 5 cents a day. Such labor is, however, not as efficient as American labor, and the difference in cost is not so great when this fact is considered. The engineers in charge of the Abukir reclamation estimate the cost of digging the lateral ditches at 3 cents per cubic yard, a figure much below that for similar work under American conditions; but where tile are used our ditching can be done as cheaply, for ditches for tile are not dug so wide as open ditches and our workmen are more efficient.

Thoroughly reclaimed land is worth from $200 to $300 per acre, the latter price having been refused for a large tract recently reclaimed at Abukir. Much of the newly reclaimed land is being rented to individual farmers at from $10 to $30 per acre per year, depending upon the state of the reclamation.

CROPS GROWN DURING RECLAMATION FROM ALKALI.

Crops are generally planted the first year of reclamation. In soils where the alkali content is high, it is necessary to wash the land six months or a year. The first crop planted is samar (*Cyperus lævigatus*), a rush used for mat-making.

This plant is set out at intervals of 18 inches and is kept constantly under water, much as rice is grown. It has an advantage over rice in that it can go without water for a period of ten or twenty days and suffer no damage. Where the land is very salty, a poor stand and yield is often the result, but almost invariably the plant yields enough to be profitable, and where good yields are secured the product is worth from $50 to $75 per acre. As stated, in nearly every case a profitable crop of samar is obtained the first year. On the worse land, however, it has sometimes been necessary to wash the soil a full year before a crop could be grown. This is particularly true of those spots which contain sodium carbonate or black alkali.

After a crop of samar has been grown, the land is in much better condition, and various crops are then planted, according to the taste of the cultivator. Rotations have been adopted for use during the reclamation, of which the following have proven useful and successful:

First. Where the land is strongly alkaline: 1, washing; 2, samar; 3, cotton. The growth of the cotton indicates the extent to which the reclamation has gone. If a good stand is had and a yield of good fiber is obtained, a new rotation is planned to suit the farmer's taste. If cotton does not do well, the land goes again into samar and receives a further washing.

Second. In land which contains an average amount of alkali: 1, samar; 2, rice; 3, cotton; or, 1, rice; 2, samar; 3, cotton.

Third. In land which does not contain a large excess of soluble salts, cotton comes earlier in the rotation and is followed by less resistant crops, as: 1, samar; 2, cotton; 3, corn. For a number of years after the reclamation has gone on, it will be found advantageous to grow either rice or samar every three or four years, in order to wash from the soil the alkali which has risen above the drains.

The cost of ditching per cubic yard can be calculated from the following contract prices for carrying on the work:

Main canals	$0 06½
Main drains	10⅓
Primary drains	04½
Secondary and tertiary drains	03⅜

One of the greatest obstacles to more rapid reclamation has been the lack of population. With the deterioration of these lands the fellahs left and the repeopling of the villages is slow. For a time the fellahs had little faith in alkali-land reclamation, but gradually the success of the method of reclamation became evident, and now settlers are easier to obtain.

Land once thoroughly reclaimed gives no further trouble from alkali if farmed with intelligence, but land partially reclaimed reverts to its damaged condition in a few years. It has been found more economical to wash land four years and be sure of thorough reclamation than to attempt the cultivation of half-reclaimed

ALKALI SPOT APPEARING IN A COTTON FIELD AS A RESULT OF ALLOWING LAND TO LIE IDLE.

soil, which invariably develops salt spots that spread from year to year.

Upon the completion of the reclamation, cotton, corn, clover, alfalfa, sugar cane, and all crops grown in the district can be grown without fear of a rise of alkali, but the partially reclaimed land is fit only for alkali-resistant crops, or crops which will grow in standing water.

SUMMARY OF RECLAMATION METHODS.

There are three methods of alkali-land reclamation in use in Egypt. Each of these methods is successful under the conditions appropriate for its use, and all are worthy of being tried in America.

1. *Flooding with open drains, as has been described.*

2. *Colmatage or Warping.*—This method of reclamation consists simply in flooding land with muddy water long enough to allow the mud to settle, after which the clear water is drawn off and more muddy water run on. Very little attention is paid to drainage, except in so far as surface drains are dug to carry away the clear water. The popular impression prevails that by this method the alkali or salt is covered up with sufficient good soil to permit plant roots to thrive. As a matter of fact, the efficiency of the method depends much more on the fact that the alkali is washed down into and mixed with the sub-soil, so that its concentration at the surface is diminished. The total amount of alkali in the soil is very slightly reduced, and when conditions again become favorable for the rise of the alkali it returns to the surface and proves as troublesome as before.

3. *Flooding with Tile Drains.*—This method has only been tried experimentally in Egypt, but promises to be the most rapid and effective way of reclaiming the land. Tile drains are placed 30 inches deep and 35 feet apart, at a cost of $30 per acre.

In the application of these methods of reclamation to American conditions there are a number of factors which enter into the problem and make necessary certain changes. American farmers have a well-grounded dislike to open ditches in fields. They take up a large amount of valuable land, require an annual outlay in cleaning and deepening, necessitate the building and annual repair of bridges, and prevent or hamper the use of machinery in agricultural operations. Tile drains take up no room, render no land unavailable for cropping, require little or no repairs if properly laid at the start, and are efficient for many years. One hundred feet of open ditch 7 feet wide occupies 700 square feet of land. The value of this, at $100 per acre, would be $1.61. The cost of digging 100 feet of open ditch of this width, 3 feet deep, is at least $4. The cost, in our Eastern states, of digging, laying tile, filling the trenches, and purchase of 4-inch tile for 100 feet of drain is about $4, so that there is a difference of $1.61 per 100 feet in favor of the tile. If allowance is made for cost of bridges and annual cleaning of open ditches, the difference will be still greater.

The soils in arid America are generally light in character and do not stand well in bank, so that great trouble would be experienced in maintaining small open ditches.

For these reasons alkali-land reclamation by means of open ditches is not to be recommended for general use. In the larger drains, where very large pipe would be required, open ditches may be used, but in a great many localities some kind of protection will be necessary to strengthen the banks and prevent their caving.

The irrigation season, except in certain parts of California and Arizona, is shorter than in Egypt, and in order to reclaim land within a reasonable length of time it will be necessary to place drains closer together. In this way the land will be reclaimed in a shorter time, because a greater quantity of water can be run through the soil in a given time. In an experiment on 40 acres now being carried on in a loam soil near Salt Lake City, Utah, the tile were placed 150 feet apart. This seems to be a good average distance at which to place tile. As the experiment progresses more definite information regarding the time required for reclamation can be given.

Prof. Milton Whitney, Chief of the Bureau of Soils, has lately expressed himself as follows in regard to the practicability of soil-washing in the West:

"The subject of alkali has been a source of much anxiety to our western

PARALLEL DRAINAGE DITCHES. ONE MAY BE EMPTIED AND CLEANED WHILE THE OTHER CARRIES THE DRAINAGE WATER.

yeople, and the vast injury that has been done through the occurrence of alkali has prejudiced outsiders in irrigation enterprises to such an extent that in many communities the subject has been exceedingly unpopular, and any reference to it in connection with certain localities has been vigorously opposed and criticised.

"It must be recognized that alkali occurs in all arid countries, and it is a problem for consideration and suitable control by the people of irrigated arid districts, as the suitable drainage of rice lands or corn and wheat lands has been in other parts of the humid regions.

"The experts of the Bureau of Soils firmly believe that the alkali lands of this country can be economically reclaimed, and that the damage from alkali is unnecessary and will not result if proper precautions are taken. Furthermore, it is a well-known fact that in most cases alkali accumulates in the most fertile soils, and the presence of alkali in the soils of arid regions should indicate to the people as a rule a high degree of fertility, provided proper methods of handling the soil are adopted.

"The publications of this Bureau have been recommending drainage for the reclamation of these waste lands. This recommendation had previously been made by other writers on the subject, and all who have given this matter any thought are unanimous in the opinion that drainage will solve the problem.

"As no work of reclamation by drainage has been carried on to completion in this country, it is impossible to say what the actual cost of reclamation would be, but very reasonable estimates based upon the cost of land drainage in the humid states have placed the probable cost of alkali land reclamation at from $10 to $30 per acre. In Egypt large areas have been reclaimed and are now producing crops, and from figures given by the engineers in charge of this work the cost of reclamation can be readily calculated.

"The results obtained in Egypt thoroughly warrant the statements made as to the practicability of reclamation by drainage, for it will be seen that the cost of reclamation is so low that much of the land of the West now lying idle on account of alkali or seepage water can be made to produce crops in from one to three years, with an expenditure much below the value of the land when reclaimed."

THE FUTURE OF FEDERAL FOREST RESERVATIONS.*

BY

EDWARD A. BOWERS,

SECRETARY OF THE AMERICAN FORESTRY ASSOCIATION, FORMERLY ASSISTANT COMMISSIONER OF THE GENERAL LAND OFFICE.

THE existing federal forest reservations were created only after a long struggle. Those of us who were engaged in the efforts that finally resulted in the passage of the act of 1891, authorizing the creation of forest reservations by presidential proclamation, and the act of 1897, which inaugurated their administration in accordance with sound ideas of forestal management, recollect how we were constantly met with the honest contentions of many men residing in the regions where it was proposed to create these reservations, with the statement that the whole idea was impracticable. They contended that it was physically impossible to protect such great areas from destruction by fire, or to measurably prevent despoliation of the public timber by persons cutting it without warrant of law. They further said that the withdrawal of such large areas of land by the federal government, thus excluding it from state taxation, was a hardship upon their respective states, without any corresponding benefit to the states, and maintained that the pioneers who were developing the country were entitled to the same free use of timber and of the range as had been accorded to their forerunners. In short, they felt that the whole idea was a fanciful emanation from the brains of eastern enthusiasts, who knew nothing whatever of the real situation.

While some converts have been made among the residents of the states where these reservations exist, I fear that too many of their citizens would still indorse the above objections to forest reservations, and for this reason it seems to me that the most important thing to insure the future success not only of these reservations but also of a forestry policy by the United States, lies in showing that these contentions are without foundation, and thus convert the population most immediately interested in the future of the federal forest reservations. How can this be done? To this question there seems to be the one answer which has thus far prevailed in the development of the United States—that is to appeal to the intelligence of our people and educate them as to what the *real* purposes of these reservations are; to show them that the reservations are of vital interest both to the people in their vicinity and also to the more remote communities far down the streams that head in the reservations. In this campaign of education constant and repeated explanation that these reserves are created for the *use* of their forests and for the regulation of the streams must be made.

In emphasizing this feature that the reservations are created for practical purposes, it seems to me that the idea which to some extent prevails, that they are created for their natural beauties and as game preserves, should be minimized. While the reserves will naturally become the resorts and homes of our wild animal and bird life, and, so far as it can readily be done, these should be protected, still it must not be forgotten that the primary purpose of the forest reservations is a practical one. They are created for the purpose of supplying wood material perpetually to the people of the United States and of maintaining natural water conditions so as to make extended irrigation more and more possible, and, by thus maintaining

*Paper read at the summer (1903) meeting of the American Forestry Association at Minneapolis, Minn.

an equable flow in the streams throughout the year, to furnish water for domestic and stock purposes. They are not under the terms of the law * created for the protection of game or the preservation of wonderful natural objects, although these may be incidentally accomplished by the creation of the reservations. These pleasurable and esthetic purposes must be cared for by the creation of the national *parks*, which are to be the playgrounds of the people, while the *forest reserves* may be said to be their woodlots and natural reservoirs. I should like to see this distinction more generally appreciated.

Perhaps the strongest single ally in the maintenance and extension of the existing reservations will come from their association with the important irrigation projects now just being inaugurated by the federal government. The men in charge of these projects are fully alive to the important assistance that the forest reservations are destined to be to the cause of irrigation. When the people generally in the arid regions fully appreciate this, we may feel certain that the future of the forest reservations is assured, for no reservoir made by the hand of man can equal in cheapness and usefulness a great forest.

The prevention of floods is of the greatest importance, and it is not at the mouth of a river that floods can be prevented, but at its source. If the water is allowed to rush down in a flood, vast quantities of detritus will be carried down to constantly fill the river bed below, thus raising its bottom year by year and compelling a corresponding raising of the levees, to which every added foot of height is added danger of breaking. Of the large amounts appropriated for "river and harbor improvements" a portion might well be expended in creating and developing forest reservations. When we consider how widely the people of the United States are annually made to suffer loss by floods, we may feel certain that an intelligent public opinion will demand the most careful supervision and care of every agency tending to prevent these floods. It remains, then, only for the forester to demonstrate how essential the maintenance of forests at the headwaters of the great streams is in preventing floods to bring another great element of support to the forest reservations in the future.

This suggests at once that the problem we are dealing with is not generally a state question, but an interstate one; that it can not be properly cared for by any state legislation, but by its inherent conditions must usually be left to the federal government. Therefore these forest reservations, created to conserve as well as to furnish timber supplies, will in all probability remain *federal reservations*. In their development national questions must be considered paramount. While it is to be hoped that in all of the states having forest lands at the headwaters of streams there will be established forest reservations, the title to such lands having passed into the hands of private owners, this can not be expected at an early date. When such reservations are made, some plan for their administration in consonance with the purposes of the federal reservations must be worked out. The future holds here a wide field for constructive legislation.

Let us now consider some of the more detailed developments that the future has in store for the forest reservations. The first is a gradual determination of their permanent boundaries. When many of these reservations were proclaimed, the regions where they are located were unsurveyed, or only in part surveyed. This necessitated their proclamation by natural boundaries, which were more or less indefinite, or by description with theoretically extended township and range lines. It

*This law reads: "May reserve * * * in any part of the public lands wholly or in part covered with timber or undergrowth, whether of commercial value or not, as public reservations." * * * In the act of June 4, 1897, providing for administration, etc., of the reserves, it is declared: "No public forest reservation shall be established except to improve and protect the forest within the reservation, or for the purpose of securing favorable conditions of water flow, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States." Timber may be appraised and sold from forest reservations when "compatible with the utilization of the forests thereon."

was not for one moment supposed by those who drew these descriptions that they were to be permanent. They were merely the best that could be done to define the area to be reserved for forest purposes. Because of a failure to appreciate this, the reservation system has been as bitterly attacked on the score of including improper lands as upon any other. With an extension of our knowledge by means of accurate topographical surveys of the regions reserved and to be reserved, we shall in time arrive at a proper delimination of the reservations. These reservations should in general be made in accordance with the topography of the country, conforming to the mountain ranges or drainage areas rather than to the arbitrary township, range, and section lines of the public-land surveys. When their boundaries are finally determined, they should be marked with monuments of the most durable character. Only when this is done is it possible to prevent unauthorized stock grazing, timber cutting, and other despoliations within the reserves.

The extension of the reserves may be expected by means of presidential proclamations, and it is my hope that we shall ultimately obtain the passage of a law reserving from all disposition public lands more valuable for timber growth and forest uses, including water conservation, than for agricultural, mineral, or other purposes, and that such lands shall be administered under a sound, economic forest policy. This was the proposition originally advanced by the American Forestry Association in a bill drawn by its executive committee as far back as 1887 and repeatedly urged upon different Congresses. This could be accomplished in a very simple way. Require every would-be entryman of the public lands to file a non-timber affidavit—that is, an affidavit which should set forth that the lands which he desires to enter are not valuable for timber, for es purposes, or the conservation of water because of the wood growth. Thus we should set aside by a gradual process of exclusion all the lands of the United States valuable in any way for forest purposes. Of course, if the entryman made a false affidavit his entry would be subject to cancellation at any time prior to the issuance of the patent.

I have called attention to the necessity for accurate surveys of the exterior boundaries of the forest reservations. Such topographic interior surveys are equally necessary in order that the officers charged with their care and administration may know the points at which to construct fire lines, utilizing all natural advantages in the best way. Road building, and trail cutting, too, are fundamental in any permanent development of great forest properties. Only by means of the roads and trails may fires be promptly extinguished and held in check and the products of the forests economically marketed. The importance of this work in any successful management of the national forest reserves can not be overestimated, and until rapid communication over a network of trails on each reserve is possible we must not blame the forest administration for fires. The methods of fire protection inaugurated on the reservations, and the reforesting, whether by natural reproduction, by intelligent cutting, or by planting, will instruct private owners in the regions where these reservations are located.

Along the lines of forest reproduction on the reservations, at first somewhat rudely carried out because of the cost, we shall see in the future great development in forestry proper, which will increase when there is a market for the product. At present many of these reservations are too remote to get the timber to market. For many years to come, the best policy for the government in disposing of the timber product of its reservations now appears to be by sales of this product at auction to the highest bidder of such portions of the timber as may be cut without injury, or to the benefit of the reservation. In connection with the sale of timber from government reservations a system of sales must be maintained for the purpose of supplying settlers and local demands prior to the sales of the regular lumbermen. Whether this shall be by means of a system of licenses author-

izing settlers to cut under careful supervision of forest officers at a nominal charge, or by a sale of superfluous wood supplies by the forest officers, must depend largely on local conditions. Many of these suggestions are now contemplated by the regulations of the General Land Office in its administration of forest reservations.

In one respect I feel that the existing laws and regulations concerning the forest reservations should be modified. I refer to the so-called lieu selections. The law provides that persons having entries within forest reservations at the date of the proclamation may exchange their lands within such reservation for a like amount of land outside the reservation anywhere upon the public domain. The purpose of this provision was to induce all persons having a right to reside within the reservation boundaries to remove therefrom. It is my belief that a certain number of *bona fide* residents within the reservation is a good thing, for in cases of emergency such persons can be called upon to assist in the extinguishing of fires or the driving out of herders illegally grazing their stock within the reservation. These residents would naturally be most alert to prevent the extension of any fires liable to injure their own holdings, and would be likely to know of any timber cutting or herding that was going on in their vicinity. By making them forest guards they could be of great assistance in protecting the reservation and useful in other forest operations.

In another most important respect our laws must be changed before we can get the best results from the forest reservations. At present the forest work of the federal government is divided among three different bureaus—the General Land Office, the Geological Survey (both in the Interior Department), and the Bureau of Forestry in the Agricultural Department. This division can not be defended, but is natural enough when historically considered. The General Land Office was organized to *dispose* of the public domain, at first as an asset of the government, and later as a means of strengthening that government by building up new commonwealths to join the sisterhood of states.

When the idea of permanently reserving portions of the public domain for forest and water uses became a reality, a new duty was imposed upon the Land Office—that is, to *administer* perpetually a portion of the public domain, not to dispose of it. Thus we see it is foreign to the previous functions of the General Land Office to perform such administrative work.

While the Land Office has its own surveying system, it provides only for sectionizing the country—that is, dividing it into squares. This is not the kind of survey needed for forest reservations, as previously pointed out, and so the Geological Survey is called upon to make the boundary surveys of the reservations, and incidentally furnish as much topographic information concerning the reserves as is possible. Hence the second division of forest work.

The real scientific forest work of the federal government is done by the Bureau of Forestry, organized primarily to investigate forest conditions, conduct experiments as to tree growth, furnish information, and make working plans. It has no general powers of administration over forest lands from the Congress of the United States, only such as are given it voluntarily by states, corporations, and individuals. In other words, the subject-matter with which it has to deal is withheld from it under existing laws. This association has repeatedly advocated uniting all this forest work into one bureau, confidently believing that it would result in a saving of money and in far better forest management of this great national resource, which should in time become a source of annual income instead of expense. For this we are now working, and must continue to work until it is done, and then we shall see our forest reservations properly managed.

With the growing interest in national management of forest resources the demand for trained men to handle private forest properties will steadily increase, and naturally those who have had practical training on the government reserves will have the preference over others, as these reserves come to be managed more and more in accordance with sound forestry. The reserves will

thus become the best sort of forest schools, not merely for the scientific foresters, but for the much larger number of men needed as rangers and forest guards. At present the demand for such men far exceeds the supply, and many large owners of forest properties in the East have been discouraged in their intention to introduce forest management on their properties by their inability to get competent men.

I have indicated some of the lines of the future development of the federal forest reserves; but the most important of all will be their educational value, not only to the people and the states where they are located, but to the whole country. These reservations, scattered through a wide range of latitude and longitude and dealing with widely variant climatic conditions, must, as the years go by, furnish steadily accumulating experience of value throughout the country, and such knowledge of forestry as will put the United States in the vanguard of those nations that make the wisest use of this fundamental national resource.

STANDARD DEVICES FOR PUMPING.

BY

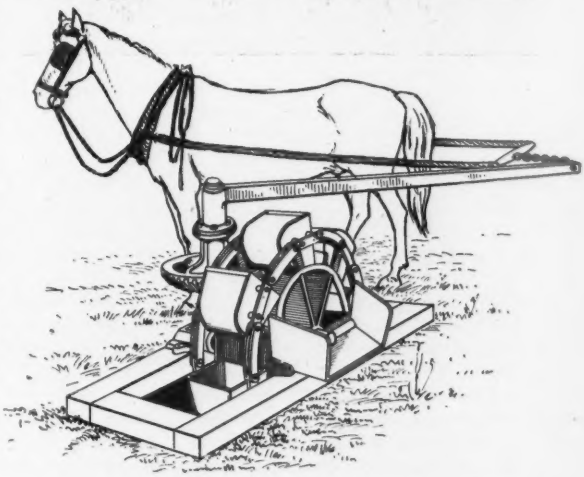
C. A. WENTWORTH.

BY far the greater portion of the water used in irrigation processes is diverted by gravity from flowing streams. Advantage is taken of the fact that 2½ or 3 feet fall to the mile is quite sufficient to lead the water wherever it is needed, whereas the main stream from which it is taken usually falls from 4 to 8 feet in the same distance. Generally it may be said that every foot in difference of elevation which the diverted water gains over its source gives it correspondingly wider radius of utility within the same valley. After a few miles of gain the diverted water may even become available as a considerable source of power.

Under certain conditions of topography, however, it may be easier or less expensive or, indeed, the only practicable way to take advantage of a source of water supply, to pump it from a lower level to the point where it is needed.

In India and Egypt, where human labor is cheap, the natives toil patiently, operating clumsy, Oriental devices in order to gain small streams of water for their thirsty crops.

The power of cattle and horses has also been employed for pumping through the ages on various forms of machinery, which have their simplest modern examples in the capstan or the hay press and the "horse-power" treadmill.



HORSE-POWER OPERATING A BUCKET PUMP.

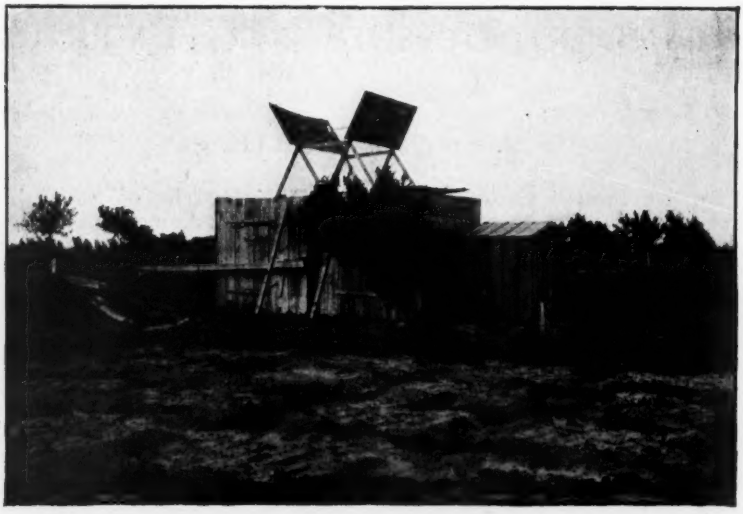
On the great plains west of the Mississippi the most available power is the force of the wind. On account of the flatness of the country the winds are almost incessant and rather more forcible than is agreeable. Fortunately, the people in these regions have been able to make a servant of the nuisance which blows the soil off their fields, and set it to make them more productive by increasing the water supply.

Various unique machines have been employed to take advantage of the measureless power afforded by the winds. Among the more ingenious home-made affairs is the wind engine, which is like an old-fashioned over-shot water-wheel in construction and action. The lower half is shielded by a simple screen of boards surrounding it on all sides, so that the wind can act only on the upper half.

Wooden mills on wooden towers have also had their day, as well as wind wheels without towers, and wheels made with sails of cloth. The modern facility of metal construction and exact engineering calculation have produced stiff, light-running windmills made entirely of steel at a price so low that no one who needs them can afford not to use them, considering the gain in efficiency.

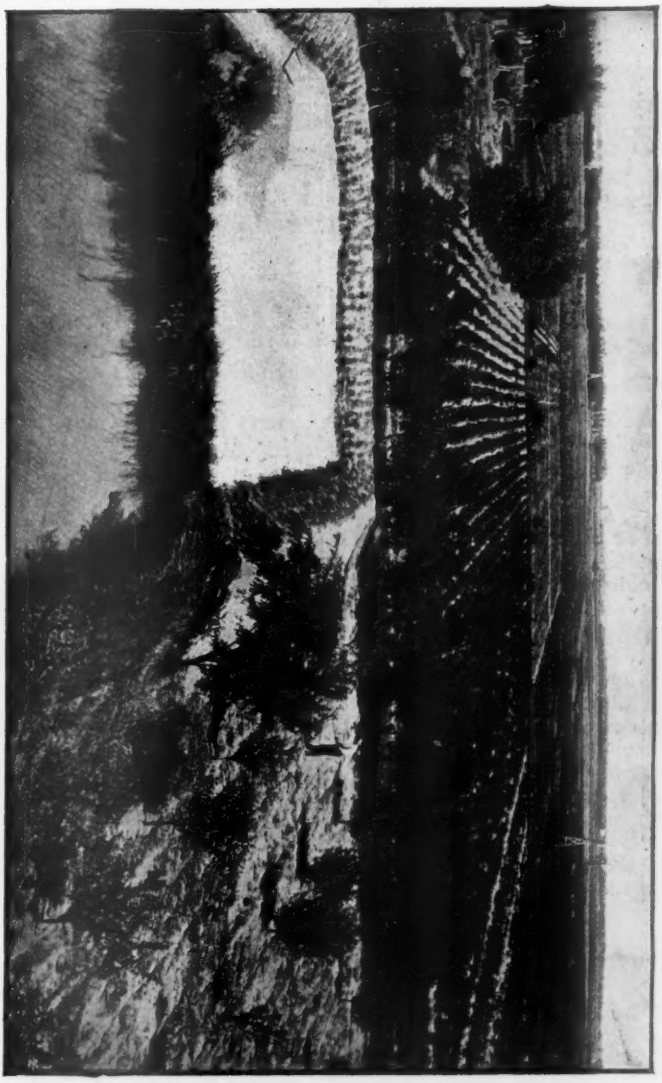
Mounted on scientifically braced steel towers, they catch every breath of air, face the wind automatically, and shut themselves off when their work is done. If the wind rises to violence which makes the exposure of much surface dangerous, they present only the edge of the wheel to the increasing pressure.

In much of the great plains country there is just enough rainfall to render a crop dubious. The cattle industry does not demand nearly as much water as does farming. Hence it follows that a few efficient mills can supply from the widely extended artesian basins the comparatively small extra amount of water necessary to insure successful operations in a country where there are no streams available.

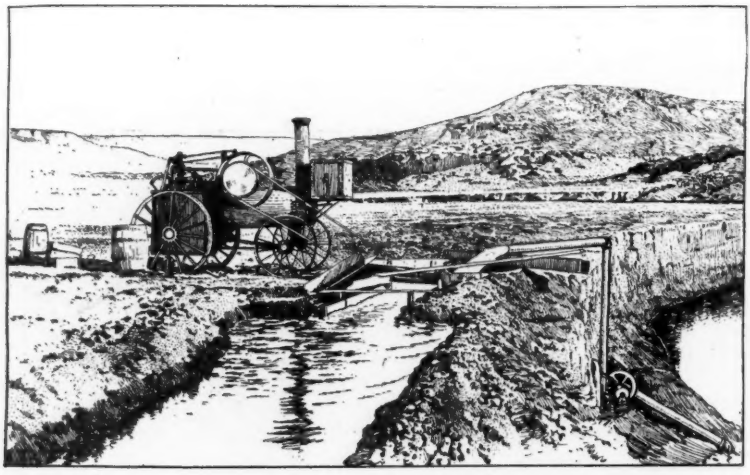


AN OVERSHOT WINDMILL.

But the wind sometimes proves a poor reliance. Some hot August, when cattle and crops alike are parching with thirst, a dead calm occurs, and the broad fans of the mills are motionless and useless for several days at a time. Then it is that the foresighted husbandman runs out the traction engine or gasoline engine, previously adapted and adjusted for such emergencies, and



WITHOUT THE WINDMILLS THIS SCENE WOULD BE A DESERT VIEW.



PUMPING WITH A THRESHING ENGINE.

saves his property, either by running one of his driven wells, disconnected from the windmill, or perhaps pumps water up from some stream to irrigate his fields, as shown in the accompanying cut of a California pumping outfit in operation.

In regions where streams are more numerous it is frequently of great value to the farmer or the owner of a country residence to force water up from a brook into his house and barn. The hydraulic ram is then employed—an old, well-known device, by means of which the momentum of water flowing through a long sloping pipe is employed to force a small part of the same water up to almost any ordinary and reasonable height.

Only the other day we saw a description of the apparatus employed by a dairy farmer ten miles from Washington, D. C., who wished to force water 300 or 400 yards uphill into a 30,000-gallon tank. He tried rams. They did not supply enough water. He tried a gasoline engine. It was expensive, needed watching, and sometimes went on a strike. He tried a windmill, which proved most unsatisfactory when most needed. Finally he dammed a tiny stream, led the water a hundred yards in a trough, and allowed it to fall on a 12-foot overshot water-wheel. A triple-cylinder pump was run from the axle by a chain and sprocket. The result was perfectly satisfactory.

The pump forces 7,200 gallons daily into the tank, which is over a quarter of a mile away and at a considerable elevation from the spring which is the source of supply.

FORESTRY AND IRRIGATION IN CONGRESS

A RÉSUMÉ OF LEGISLATIVE ACTION IN REGARD TO CONSERVATION OF OUR WOODS, WATERS, AND PUBLIC LANDS BY THE FIFTY-EIGHTH CONGRESS, SECOND SESSION.

January 25, 1904.

In the Senate: Mr. Bard, from the Committee on Public Lands, to whom was referred the bill (S. 904), granting to the State of California 5 per cent of the net proceeds of the cash sales of public lands in said state, reported it without amendment, and submitted a report thereon.

The bill (S. 887) for the purchase of a national forest reserve in the Southern Appalachian Mountains, to be known as the National Appalachian Forest Reserve, was announced as first in order, but on request of Mr. Lodge and Mr. Teller was passed over.

The same bill was first in order at one time on January 27, but at the request of Mr. Teller (through Mr. Cockrell) was again passed over, without losing its place.

The bill (S. 1490), to authorize the sale of a part of what is known as the Red Lake Indian Reservation, in the State of Minnesota, was considered as in Committee of the Whole. It authorizes the Secretary of the Interior to sell, subject to the homestead laws of the United States, to the highest bidder, at public auction, in tracts not to exceed 160 acres to each individual, all that part in the State of Minnesota lying westerly of the range line between ranges 38 and 39 west of the fifth principal meridian, approximating 256,000 acres. It is provided that the land shall not be sold for less than $4 per acre.

The bill was reported without amendment and passed.

In the House: Mr. Needham, from the Committee on the Public Lands, to which was referred the bill of the House (H. R. 3581) providing the means of acquiring title to two groves of *Sequoia gigantea* in the State of California, with a view to making national parks thereof, reported the same, with amendment, accompanied by a report (No. 461); which said bill and report were referred to the Committee of the Whole House on the state of the Union.

January 26.

In the House: Mr. Heyburn called up from the table and discussed Senate joint resolution No. 30, directing the stay of all proceedings now pending upon any application to enter or patent even-numbered sections of the public lands in lieu of odd-numbered sections surrendered by the railroad company or its assigns within the limits of any forest reserve. The resolution was finally referred to the Committee on Public Lands.

Senate bill 490, to authorize the sale of a part of what is known as the Red Lake Indian Reservation, in the State of Minnesota, was referred to the Committee on Indian Affairs.

A similar bill (H. R. 11130), by Mr. Steenerson, was referred to the Committee on Indian Affairs.

By Mr. Bede: A bill (H. R. 1136) to provide for the hearing and determination of contests of the claims of states to swamp land under swamp-land grants. To the Committee on Public Lands.

A resolution of the Salida (Colorado) Board of Trade was laid on the Speaker's desk, protesting against changes in the present land laws.

January 27.

In the Senate: Mr. Bard, from the Committee on Public Lands, to whom was referred the bill (S. 2223) providing a means of acquiring title to two groves of *Sequoia gigantea*, in the State of California, with a view to making national parks thereof, reported it with an amendment and submitted a report thereon.

Mr. Gamble, from the Committee on Public Lands, to whom was referred the bill (S. 579) to regulate the use by the public of reservoir sites located upon the

public lands of the United States, reported it without amendment and submitted a report thereon.

The bill (S. 122) authorizing the Secretary of the Interior, at his discretion, to restore to public entry lands embraced in whole or in part within segregations for reservoirs, was reported without amendment and passed.

In the House: Mr. Volstead, from the Committee on the Public Lands, to which was referred the bill of the Senate (S. 1558) to grant to the State of Minnesota certain vacant lands in said state for forestry puposes, reported the same without amendment, accompanied by a report (No. 605), both of which were referred to the Committee of the Whole House on the state of the Union.

By Mr. Powers of Massachusetts: A bill (H. R. 11209) to repeal the act providing for the sale of timber and stone lands, the desert-land act, and the commutation provision of the homestead act. To the Committee on the Public Lands.

January 28.

In the Senate: Mr. Stewart, from the Committee on Indian Affairs, to whom was referred the bill (S. 2860) to further amend an act to amend an act approved January 21, 1903, entitled "An act to amend an act entitled 'An act to provide for the use of timber and stone for industrial purposes in the Indian Territory,' approved June 6, 1900," reported it with amendments and submitted a report thereon.

February 1.

In the House, by Mr. Norris: A bill (H. R. 11520) providing for an additional homestead entry under certain conditions.

February 3.

In the House, by Mr. Dixon: A bill (H. R. 11673) for the survey and allotment of lands now embraced within the limits of the Flathead Indian Reservation in the State of Montana, and the sale and disposal of all surplus lands after allotment.

February 4.

In the House: Mr. Wadsworth, from the Committee on Agriculture, reported a bill (H. R. 11825) making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1905, which was read a first and second time, and, with the accompanying report, referred to the Committee of the Whole House on the state of the Union, and ordered to be printed.

February 5.

In the Senate; Mr. Perkins introduced a bill (S. 4134) granting to the city and county of San Francisco for water-supply purposes the use of certain lands in a forest reservation in the State of California. Referred to the Committee on Public Lands.

In the House: The House resolved itself into the Committee of the Whole House on the state of the Union. Mr. Wadsworth brought up for discussion the bill (H. R. 11825) making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1905. The bill was passed. The section relating to the Bureau of Forestry reads as follows, as amended:

"General expenses, Bureau of Forestry: To enable the Secretary of Agriculture to experiment and to make and continue investigations and report on forestry, forest reserves, forest fires, and lumbering; to advise the owners of woodlands as to the proper care of the same; to investigate and test American timber and timber trees; to seek through investigations and the planting of native and foreign species, suitable trees for the treeless regions, including the erection of the necessary buildings, provided that the cost of any building erected shall not exceed $500; to collect and distribute valuable economic forest tree seeds and plants; for the employment of local and special agents, clerks, assistants, and other labor required in practical forestry, and in conducting experiments and investigations in the city of Washington and elsewhere, and for collating, digesting, reporting, illustrating, and printing the results of such experiments and investigations; for the purchase of all necessary supplies, apparatus and office fixtures; for freight, and express charges and traveling and other necessary expenses, $363,000, of which sum not to exceed $15,500 may

be used for rent. And the employés of the Bureau of Forestry, outside of the city of Washington, may, in the discretion of the Secretary of Agriculture, without additional expense to the Government, be granted leave of absence not to exceed 15 days in any one year."

February 8.

In the Senate: Mr. Warren presented petitions of the National Live Stock Association, praying:

(1) For the enactment of legislation providing for the transfer of the administration of the forest reserves to the Department of Agriculture.

(2) Praying for an appropriation to carry forward the investigation of poisonous plants upon the ranges and the remedies or antidotes for such poisons.

(3) Praying that the Special Land Commission be given time and opportunity to study the varied conditions of different localities, that the people of each locality be given opportunity to be heard, and that no hasty action be taken upon the commission's report until the people have had time to consider any plan recommended, and, finally, that if any portion of the public ranges is placed under government control, the administration of such may be through the Department of Agriculture.

(4) Praying for investigation of the "lieu-land laws" and such modifications of the same as will prevent abuses.

Mr. Proctor (for Mr. Dillingham) introduced a bill (S. 4166) to repeal "An act for the protection of game in Alaska, and for other purposes," approved June 7, 1902, and to protect deer, moose, and caribou in Alaska. Referred to the Committee on Territories.

Mr. Perkins introduced a bill (S. 4193) providing for the appropriation of water from the Colorado River for irrigation purposes; which was referred to the Committee on Irrigation and Reclamation of Arid Lands.

February 10.

In the House: The following papers were laid upon the Clerk's desk:

Petitions from the National Board of Trade of Cleveland, Ohio, favoring the passage of bill (H. R. 8460), providing for the transfer of forest reserves to the Department of Agriculture.

Resolutions of the National Board of Trade urging repeal of the timber and stone act, the desert-land act, and the commutation clause of the homestead act.

February 11.

In the House: Petitions of the National Board of Trade urging the repeal of the desert-land act were laid upon the Clerk's desk by three members.

February 12.

In the Senate: A message from the House announced that, among others, it had passed with amendment the bill (S. 1490) to authorize the sale of a part of what is known as the Red Lake Reservation in the State of Minnesota, in which amendment the concurrence of the Senate was requested. The Senate concurred in the amendment and the bill was passed.

February 17.

In the House, by Mr. McLachlen: A bill (H. R. 12510) providing for the rights of way in and through public lands, reservations, and certain national parks. Referred to the Committee on Public Lands.

February 18.

In the House: A message from the Senate announced that, among others, Senate bill 579, "An act to regulate the use by the public of reservoir sites located upon the public lands of the United States," had been passed, in which action the concurrence of the House was requested.

Mr. Fitzgerald laid on the Clerk's desk a resolution of the National Board of Trade favoring the transfer of forest reserves from the Department of the Interior to the Department of Agriculture.

Mr. Hill, of Connecticut, and Mr. Lilley also presented petitions from various sources favoring a forest reserve in the White Mountains and the protection of the Calaveras Big Trees.

February 19.

In the House: Mr. Lamar, of Mis-

souri, secured consideration of the bill (H. R. 8435) providing that all proofs, affidavits, and oaths required under the homestead, preëmption, timber-culture, desert-land, and timber and stone acts need no longer necessarily be made in the district where the land lies, as formerly required, but may be made in another district, provided the place where they are taken is within the same county or parish as the lands in question, and that affidavit is made, satisfactory to the Commissioner of the General Land Office, that they were taken before the nearest or the most accessible qualified officer. The bill was passed.

February 20.

In the Senate: A message from the House announced that the Speaker had signed (among others) the bill (S. 1490) to authorize the sale of a part of what is known as the Red Lake Indian Reservation, in the State of Minnesota.

Mr. Hansbrough introduced a bill (S. 4429) relating to the creation of forest reservations on the public domain, and for other purposes.

February 20.

In the Senate: Mr. Hansbrough introduced a bill (S. 4429) relating to the creation of forest reservations on the public domain.

February 23.

A message from the President of the United States announced to the Senate that the President had on the 20th instant approved and signed the act (S. 1490) to authorize the sale of a part of the Red Lake Indian Reservation in the State of Minnesota.

February 24.

In the Senate: Mr. Burnham presented a petition of the American Paper and Pulp Association praying for the establishment of a national forest reserve in the White Mountains.

During consideration of the agricultural appropriation bill (H. R. 11825) amendments by the Committee on Agriculture and Forestry were agreed to which increase the total appropriation for the Bureau of Forestry to $450,000.

February 26.

In the House: A message from the Senate announced that the Senate had passed, with amendments, the bill (H. R. 11825) making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1905, in which the concurrence of the House of Representatives was requested.

Mr. Mondell introduced a bill (H. R. 13095) to regulate the use of forest reserve timber.

RECENT PUBLICATIONS.

The Botanical Gazette. February, 1904. Vol. XXXVII, No. 2. The University of Chicago Press. Contains an article by E. B. COPELAND and F. A. SHRINER, called "Deforestation and Creek Flow About Monroe, Wis."

The accompanying map shows as nearly as possible the changes in the surface flow of water which have accompanied the gradual removal of the native forest from four townships of Green county, Wis.

The original forest covered 83 per cent of the entire area. Twenty years ago the woodland had shrunk to 28 per cent. As mapped for September, 1902, it does not cover more than 6 per cent of the space which the primitive forest occupied.

"Until 1887 no creeks went dry, although there was a noticeable lowering. Since then the streams that are dry during the entire summers or longer amount to 65½ miles in length.

"Once twelve mills ran by water power within this area. Several now use steam and the rest have been discontinued. Where most of these mills stood less water runs now than used to be wasted."

The Agricultural Gazette of New South Wales. Vol. XIV, Part 12. December, 1903.

This is one of the most attractive and meaty agricultural papers that come to this table. As a result of recent droughts in New South Wales, the attention of farmers in that state is particularly turned to irrigation at this time. In this number Mr. W. J. Allen, who gained familiarity with irrigation problems during ten years of former residence at Riverside, California, contributes an article showing the success of various crops which obtained water during the drought from artesian wells. He also gives practical information for the proper methods of controlling and applying water to lucerne, hay crops, trees, and vines.

The Hawaiian Planters Monthly. January, 1904. Supplement, The Hawaiian Forester and Agriculturist.

The supplement is really a distinct magazine, the official organ of the Hawaiian Board of Agriculture and Forestry. Mr. William L. Hall's "Hawaiian Forests," which appeared as a leading article in the December number of FORESTRY AND IRRIGATION, is reprinted entire. We welcome the newcomer in the field of journalistic forestry. Such a publication should do useful work in the field opened by the increasing interest in forestry now evident in Hawaii.

Journal of Proceedings of the National Grange Patrons of Husbandry. Thirty-seventh Annual Session. Rochester, N. Y., 1903.

Three pages of this journal are devoted to discussion of the past workings of our defective land laws, with frequent reference to the report of Hon. Paris Gibson on a bill to repeal them. The grange adopted and heartily endorsed the summary of the Gibson report, which recommended that the only title to homestead land should be obtained by five years' actual residence and continuous cultivation.

PUBLICATIONS RECEIVED.

Bulletin de la Société Centrale Forestière de Belgique. 1ª livraison, Janvier, 1904. Bruxelles: Imprimerie F. Vanbuggenhoudt.

Schweizerische Zeitschrift für Forstwesen. Organ des Schweizerischen Forstvereins. Redigiert von Dr. F. Frankhauser. Verlag von R. Francke. Bern, 1904.

Allgemeine Forst-und Jagd-Zeitung. 1904, Januar. Frankfurt am Main.

U. S. Department of Agriculture. Farmers' Bulletin No 187. Drainage of Farm Lands. By C. G. Elliott. Washington: Government Printing Office, 1904. An excellent practical treatise which should be read by every farmer who has occasion to drain, and certainly by every irrigator.

U. S. Department of Agriculture, Farmers' Bulletin 185. Beautifying the Home Grounds. By L. C. Corbett. Washington: Government Printing Office, 1904.

Simple landscape gardening for the owners of rural and suburban homes.

Transactions of the Royal Scottish Arboricultural Society. Vol. XVII, Part II. Edinburgh, MCMV.

The Indian Forester. A Monthly Magazine of Forestry, Agriculture, Shikar and Travel. Allahabad. December, 1903.

Oklahoma Agricultural Experiment Station Bulletin 61. January, 1904.

Field Experiments. Sugar Beets and Mangels.

Oklahoma Agricultural Experiment Station Bulletin 60. December, 1903.

Planting Trees for Posts, Fuel and Windbreak.

U. S. Department of Agriculture, Division of Biological Survey, Circular 40. Directory of State Officials and Organizations Concerned with the Protection of Birds and Game, 1903. Issued January 30, 1904.

NEW MEMBERS OF THE AMERICAN FORESTRY ASSOCIATION.

The following-named persons have joined the American Forestry Association since our last issue:

Alexander, Gerard, Louisville, Ky.
Anderson, A. A., 80 West Fortieth street, New York City (Life).
Anderson, David, Collbran, Colo.
Arnold, Paul E., Mont Alto, Franklin county, Pa.
Baldwin, Roger S., 44 Wall street, New Haven, Conn.
Bates, Miss Mary D., Ipswich, Mass.
Benson, Edward A., 1021 Cambridge avenue, Milwaukee, Wis.
Bliss, Richard, P. O. Box 507, Newport, R. I.
Boynton, E. W., Sewanee, N. J.
Chandler, A. E., Carson, Nev.
Corbett, John W., Mountainair, N. Mex.
Davidson, H. E., 530 Atlantic avenue, Boston, Mass.
Dill, W. O., Sprigg, W. Va.
Finch, W. T., Northwood, Herkimer county, N. Y.
Fuguet, H., 260 Bullitt Building, Philadelphia, Pa.
Goodding, Leslie N., 1201 D street, Lincoln, Neb.
Hale, Mrs. Benjamin, Newburyport, Mass.
Hanson, A. E., Fredericton, N. B., Canada.
Harris, H. R., Marquette, Mich.
Henderson, T. J., Wengler, Shasta county, Cal.
Hoppin, Mrs. Francis L. O., 122 East Twenty-second street, New York City.
Hubbard, Miss Helen, Charlestown, N. H.
Hunnewell, Arthur, 87 Milk street, Boston, Mass.
Isenberg, H., Lihue, H. T.
Jones, Howell, Topeka, Kans.
Jopling, J. E., Marquette, Mich.
Kaufman, N. M., Marquette, Mich.
Kreutzner, William R., Cedaredge, Colo.
Lay, Miss Harriett M., 4015 Pine street, Philadelphia, Pa.
Lincoln, Isaac, Aberdeen, S. Dak.
McCauley, Calvin H., Jr., Williamsport, Pa.
Marshall, George E., York Village, Me.
Miles, Jonas M., Concord, Mass.
Moseley, Mrs. Fred'k S., Newburyport, Mass.
Neel, Harry C., 182 Mansfield street, New Haven, Conn.
Opie, James P., Shamokin, Pa.
Parker, Edward Ludlow, Concord, Mass.
Peck, A. S., Bureau of Forestry, Washington, D. C.
Pence, J. T., Boise, Idaho.
Perkins, Miss Ellen G., Athens, Bradford county, Pa.
Reid, Clarence L., 135 Prospect street, New Haven, Conn.
Southard, George H., 164 Montague street, Brooklyn, N. Y.
Twitchell, Lee D., Mansfield, Ohio.
Twomby, John Fogg, 34 Green street, Brookline, Mass.
von Tempski, L., Makawao, Maui, H. T.
Woods, Palmer P., Mahukona, H. T.
Wyckoff, Rev. C. S., 582 Flatbush avenue, Brooklyn, N. Y.

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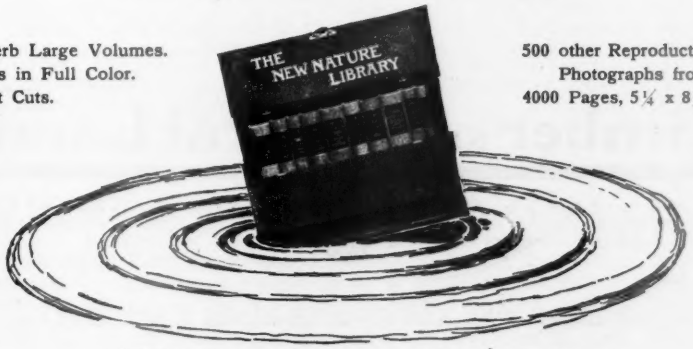

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Crookston, Minn.

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January 12, 1904.

AARON L. TREADWELL,
Professor of Biology,
Vassar College,
Poughkeepsie, N. Y.

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ARKANSAS

MANGANESE ORE LANDS.—800 acres, half mile from R. R., analyzing 50% metallic ore. Estimated to yield 800,000 tons at cost not to exceed $2 per ton, f. o. b. Fine investment. Particulars on application.

43,000 acres of timber land, a continuous body, located on both sides of a navigable river and convenient to 3 lines of railroads. Logging operations can be conducted all the year round at a very low cost. Labor cheap and plentiful. A large milling concern in this locality cuts and delivers logs from stump to mill for $1.50 per thousand. The timber is estimated to cut on an average of 26,000 feet per acre; some acres will cut as high as 80,000 to 100,000 feet. The character of timber per acre, estimated, to cut as follows: Oak, 6,000 feet; Gum, 5,000 feet; Ash, 2,500 feet; Pecan, 4,000 feet; Persimmon, 3,000 feet; Hackberry, 2,000 feet; Elm, 1,000 feet; Cypress, 1,000 feet; Locust, 1,000 feet; Tupulo Gum, 1,000 feet. This tract is unexcelled of its kind in the South. Full particulars, together with price and terms, furnished on application.

SHORTLEAF PINE.—1,350 acres in Cleburne county. Timber good size and thrifty. Average cut, about 6,000 feet. Total cut, 8,000,000 feet. Price in fee, **$11,000**.

HARDWOOD.—76,000 acres on both sides of the Ouachita River, in Union, Bradley, and Ashley counties, Arkansas, with splendid transportation facilities. It consists of hardwoods with a little Pine, and will cut an average of 6,000 feet to the acre. About 70% of this amount is White Oak, and the remaining 30% is divided between Red and Willow Oak, Pine, Cypress, and Gum. Disinterested individuals who have just returned from ranging this timber speak of it in the highest terms and say that as a milling proposition it is by all odds the best they have seen in the South. The average cut given above is based on a very careful and conservative estimate made of 69,000 acres, the balance having been made after the estimate was made. The soil is very rich and fertile and when ready for the plow will sell for more than is now asked for land and timber. **$5.50 per acre.**

HARDWOOD.—10,000 acres in Arkansas; on railroad and also navigable river flowing into the Arkansas. Will cut 10,000 feet per acre; large percentage White Oak; balance Red, Burr, Water, Post, and Overcup Oak, Ash, Gum, and Hickory. **Price, $5.50 per acre.**

CALIFORNIA

CALIFORNIA TIMBER

GROUP A.—5,000 acres sugar and yellow pine in Eldorado county; will cut 45,000 feet per acre. **$20 per acre.**

GROUP B.—2,000 acres yellow pine in Eldorado county; will cut 25,000 feet per acre, and 4,000 cords of wood on tract in addition; when cleared, the best deciduous fruit lands in the state. **Only $6 per acre.**

GROUP C.—4,640 acres of redwood in Mendocino county, on line of railroad; will cut 40,000 feet per acre; also Oregon pine, not estimated. **$20 per acre.**

GROUP D.—22,000 acres of redwood timber in Mendocino county; more than 400,000,000 feet now standing; railway to shipping point on ocean; this proposition includes mills in operation; capacity, 100,000 feet per day; net profits alleged to be $75,000 to $100,000 per annum. **Bargain at $450,000.**

GROUP E.—12,000 acres redwood on Garcia River, Mendocino county; mill site and landing on ocean; will cut 40,000 feet per acre. **Price, $25 per acre.**

Cedar, pine, and spruce lands also for sale in unlimited quantities, particulars of which furnished on application.

FLORIDA

CYPRESS TIMBER.—Near the St. John's River, about 1,400 acres of good cypress timber; can be bought cheap for the quality; located in the midst of a forest of Longleaf Yellow Pine, also at a reasonable price. Full particulars given on application.

FLORIDA PHOSPHATE LANDS.—A magnificent bed of high-grade phosphate rock, located on the railroad in east Florida. The bed is 20 acres in extent, quantity unlimited. Government analysis shows 74.29 %. The rock comes to the surface in most places and can be mined at a small expense. A splendid opportunity for investment. Can be purchased outright or bought on royalty.

LONGLEAF PINE.—114,000 acres. Southern Railroad crosses the northern part of this tract and whole tract lies very close to Charlotte Harbor. Owner claims tract will cut not less than 2,500 feet to the acre, and titles all right. **Price, $2.00 per acre.**

LONGLEAF PINE.—40,000 acres that will cut 5,000 feet per acre. **Price, $6.00 per acre.**

LONGLEAF PINE.—20,000 acres in one body. Will cut 2,500 feet per acre of 8 x 8, 30 feet and upward, round timber, *i. e.*, has never been turpentined. Railroad crosses corner. If taken in one body, **price, $3.00 per acre**

LONGLEAF PINE.—16,511 acres—average cut, 3,000 feet; 11,520 acres—average cut, 3,500 feet; 5,760 acres—average cut, 3,500 feet; all located in Liberty county, close together, on good water transportation and within easy reach of Corrabelle, Florida, where there are large sawmills. Can be handled as one proposition. Trees have not been turpentined. **Price, $3.25 per acre for whole tract.**

LONGLEAF PINE.—417,000 acres, estimated to cut 3,000 feet to the acre. **Price, $3.00 per acre.**

LONGLEAF PINE.—140,000 acres. This is guaranteed to cut 2,500 feet per acre. **Price, $2.50 per acre.**

LONGLEAF PINE.—53,000 acres located near Tallahassee, Florida. Will cut 3,000 feet **$3.00 per acre.**

LONGLEAF PINE.—500,000 acres, and can add 500,000 acres more, making one million acres in one solid body of virgin Pine and Cypress. **Price, from $2.50 to $3.00 per acre.**

CYPRESS.—180,000 acres. Tract faces on Gulf. Will cut 2,500 feet per acre, Longleaf Pine, and in addition owner claims 100,000,000 feet of the finest Cypress in the South. **$3.00 per acre in fee.**

KENTUCKY

95,000 acres of coal and timber land, in Pike county, Kentucky.

LOUISIANA

HARDWOOD TIMBER LAND.—175,000 acres alluvial land will be sold in parcels to suit purchaser at from $5 to $12 per acre. Can sell 100,000 acres in solid body. All soil is rich, and difference in price depends wholly on value of timber standing, which will cut from 3,000 to 6,000 feet per acre. To home-seekers, small tracts at $10 per acre; $1.50 down and balance in 3 and 5 years. Rice, sugar cane, cotton, and alfalfa are not grown to better advantage anywhere else in the state.

LONGLEAF PINE.—40,000 acres of Longleaf Pine in Southwest Louisiana. Guaranteed cut 14,000 feet per acre. **Price, $28.00 per acre.** Satisfactory terms.

LONGLEAF PINE.—20,000 acres Longleaf Pine, southern Louisiana; on logging stream not far from railroad; another railroad surveying to build through it. This timber will cut all the way from 5,000 to 15,000 feet per acre. As a whole it will average 6,000 to 7,000 feet. Price with land, which is good soil for agricultural purposes, **$9 per acre.**

LONGLEAF AND SHORTLEAF PINE.—100,000,000 feet with double circular sawmill, planer, two-room standard dry-kiln, good sheds, 75 or 80 tenant houses renting for from $3 to $10 each a month; log road seven miles long laid with 35-pound steel rails, three miles more graded and right of way cut for ten miles, and in addition 7,000 to 10,000 oak ties. Mill has a capacity of 75,000 to 80,000 feet per day. Price, **$1.60** per thousand feet for timber, and at cost less reasonable shrinkage for mill and plant.

LOUISIANA—Continued

SHORTLEAF PINE.—700,000,000 feet of Shortleaf Pine. The Iron Mountain R. R. is now building directly through this tract. 8,000 acres of this tract are in fee-simple, which goes with the stumpage. The owner will sell all in one lot or in lots of 150,000,000 feet. The cut will average about 7,000 feet per acre.

SHORTLEAF PINE.—12,000 acres. Will cut 7,000 feet of Shortleaf Pine per acre. Is directly on the Texas and Pacific R. R. Price, land and timber, **$7.50 per acre.**

HARDWOOD.—6,300 acres near Washington, La., one-half mile from railroad. Will cut 8,000 feet per acre; 4,000 feet White Oak, then Red Oak, Gum, and Ash. Bordered by navigable river; soil alluvial and very rich. **Price, $8 per acre.**

HARDWOOD.—33,000 and 17,000 acres, bordered by Tensas and Macon Rivers. The main line of the Gould system is surveyed through this land. This is one of the best timber and land propositions in the South. Will cut 8,000 feet per acre of Oak, Ash, Gum, Pecan, and Cypress. **Price, $6 per acre.**

MISSISSIPPI

LONGLEAF YELLOW PINE.—40,000 and 8,000 acres of Longleaf Yellow Pine. This is a fine tract of pine near the N. O. and N. E. R. R. Will cut 10,000 feet per acre of Longleaf Yellow Pine. Lies in comparatively compact body. Price of the 40,000 acres, **$24** per acre in fee-simple; of the 8,000 acres, **$16** per acre in fee-simple.

LONGLEAF PINE.—25,000 acres on railroad. Guaranteed to cut 8,000 feet per acre. Also sawmill and full equipment. **Price, $450,000.**

LONGLEAF PINE.—16,000 acres on Gulf & Ship Island Railroad. Will cut 10,000 to 12,000 feet per acre. **Price, $26 per acre.**

LONGLEAF PINE.—22,000 acres on Gulf & Ship Island Railroad. Will cut 10,000 to 12,000 feet per acre. **Price, $26 per acre.**

LONGLEAF PINE.—10,000 acres. Will cut 8,000 feet per acre. One-half has been turpentined. **$9** per acre for that which has been turpentined, **$11** per acre for that which has not.

HARDWOOD.—38,760 acres, lying between the Yazoo and Sunflower Rivers, both navigable and here only ten miles apart. The Yazoo & Mississippi Valley Railroad crosses one corner of the tract. This tract is claimed by timber experts to cut 7,000 feet per acre of the usual hardwoods of this locality—oak, hickory, gum, ash, etc. **Price, $7.50 per acre.**

HARDWOOD.—6,000 acres within one mile of railroad. Estimated to cut 5,500 feet poplar, hickory, and white oak. **Price, $9 per acre.**

HARDWOOD.—10,000 acres on new railroad. Estimated to cut 5,500 feet per acre, poplar and white oak. Land very rich, worth $20 per acre for farming when timber is removed. **Price, $11 per acre.**

HARDWOOD.—44,000 acres hardwood. Will cut 9,000 feet per acre, white and red oak, hickory, ash, gum, and cypress. Railroad runs through this tract. Price, **$7.50** per acre in fee-simple.

HARDWOOD.—100,000 acres hardwood on Yazoo & Mississippi Valley Railroad and Sunflower River. Virgin forest—oak, ash, gum, and cypress. Will cut 9,000 feet per acre. **Price, $10 per acre.**

NORTH CAROLINA

250,000 ACRES FARMING AND TIMBER LANDS.—First and second growth estimated to cut 350,000,000 feet of pine, 500,000,000 feet of gum, 75,000,000 feet cypress. Juniper estimated to cut 2,000,000 poles. Located on the Atlantic coast. Railroad and two rivers

70,000 ACRES PINE, CYPRESS, JUNIPER, ASH, AND GUM TIMBER in Eastern North Carolina. This property is located on two sounds which empty into the Atlantic Ocean, 100 miles south of Norfolk, Va. Exceptional water transportation facilities. The longest haul to water will not exceed four miles, and would require railroad and steam skidder. The timber is estimated by a practical timber expert to cut the following amount of merchantable lumber: 85,000,000 feet of Short Leaf N. C. Pine, 100,000,000 feet of Juniper, 15,000,000 feet of Cypress, 100,000,000 feet of Black and Sweet Gum. The timber rights on the above will be sold for one dollar per thousand, with ample time to remove same, or can be purchased in fee, together with 80,000 acres additional, suitable for game preserve or farming purposes, at a very small cost. This is probably the best investment in North Carolina for the money.

HARDWOOD.—20,000 acres of hardwood in Macon county. Will cut 8,000 feet. Six miles from railroad, now being built. **Price, $5.00 per acre.**

NORTH CAROLINA—Continued

HARDWOOD.—12,000 acres. Virgin forest of poplar, white oak, red and chestnut oak, hemlock, and some white pine. 1½ cords tan bark per acre. This property is at present 14 miles from the railroad, but the Southern Railroad is now building a branch which will pass through this tract. Will cut from 12,000 to 15,000 feet per acre, on a conservative estimate. **Price, $7.50 per acre.**

SOUTH CAROLINA

500,000,000 FEET OF CHOICE STANDING TIMBER.—In South Carolina, convenient to transportation both by rail and water, near tide water possessing fine harbor.

GROUP A.—Consists of 11,000 acres, estimated to cut 25,000,000 feet of cypress, as choice as grows in the South; 18,000,000 feet excellent short-leaf pine, 5,000,000 feet of cottonwood, 8,000,000 feet of oak, 3,000,000 feet of ash, balance of timber hickory, sycamore, elm, gum, etc.

GROUP B.—22,000 acres, estimated to cut 80,000,000 feet of choice cypress, 70,000,000 choice short-leaf North Carolina pine, balance of timber oak, ash, hickory, sycamore, gum, etc.

GROUP C.—14,000 acres, estimated to cut 30,000,000 feet of choice cypress, 15,000,000 of oak, 15,000,000 short-leaf pine, 8,000,000 cottonwood, 10,000,000 ash, balance hickory, sycamore, elm, gum, etc. If the above tracts are purchased outright the timber will cost less than one dollar per thousand.

TENNESSEE

COAL LAND.—3,000 acres Jellico coal land on main line of C. N. O. & T. R. R. in Kentucky, near Tennessee line. Mines are now paying net profit of $1 per ton to owner, and will pay more. Further particulars on application.

VALUABLE SLATE QUARRY.—We have for sale a valuable property in East Tennessee, containing over 2,000 acres of excellent timber land; in addition, however, to the timber there is upon the tract a deposit of remarkably fine slate. The slate is easily and cheaply quarried—splits thin, straight and smooth, and punctures without scaling. After thorough tests the best experts have pronounced it equal to any slate in the United States. The quantity seems to be inexhaustible.

A mill has already been erected for grinding, polishing and finishing the slate, all of which is in good condition.

There is also a large storehouse, good dwelling and several cabins, besides other improvements, such as tram-roads, blacksmith shop, etc., all of which goes with the property. Immediately available is also a splendid water power of about 18 feet fall, strong enough to run a large manufacturing plant to economically handle both the slate and timber. This is reasonably accessible to railroads, and most of the year has water transportation to the Mississippi and Ohio rivers. The location of this tract gives it easiest and cheapest access to the Western market, an important factor in connection with the Western trade, which at present is supplied from more distant quarries. The reason for this property being placed on the market will be given any one interested in its possible purchase, and will be found satisfactory. We believe a bargain can be had in its purchase.

HARDWOOD.—20,000 acres hardwood, estimated to cut 8,000 feet per acre. Poplar, oak, lynn, chestnut, etc. **Price, $9 per acre.**

TEXAS

PINE.—50,000,000 feet Pine stumpage, south Texas. Splendid location for a mill. This tract of Pine is well blocked up and is nearly in a solid body, located within 20 miles of Beaumont, on one railroad and within 2½ miles of another.

WEST VIRGINIA

LIME AND CEMENT.—472 acres, containing coal, lime, and cement stone. Limestone 400 feet thick, cement rock 35 feet thick, and coal 4 to 5 feet thick. Plenty of timber on property. Plant ready for operation with modern machinery; railroad sidings on premises. For further details apply to this department.

SPECIAL, 20,000 ACRES OF TIMBER.—Spruce and hemlock; one-half will cut 20,000 feet to the acre, balance 12,000 feet. Modern sawmill, daily capacity 50,000 feet; planer, docks, trams, etc.; 10 miles standard gauge railroad, with engine, cars, steam loader, and skidder; 8 miles additional graded, with ties and rails on ground ready to lay. Storehouse, dwellings; in short, a modern lumber plant in daily operation on railroad, with good connections east and west. Apply for further particulars.

COAL LANDS.—10,000 acres coal lands, convenient to railroads; three veins, one 4½ feet thick, and without slate. Cheap. Send for particulars.

WEST VIRGINIA—Continued

TIMBER INVESTMENTS.—8,000 acres spruce and hemlock, on railroad; will cut 20,000 feet per acre. **$35 per acre.**

1,500 acres spruce and hemlock, 2 miles from railroad; will cut 25,000 feet per acre. **$37 per acre**

54,000,000 feet fine timber, on tract of 5,500 acres on Greenbriar River and C. & O. R.R.; will cut 20,000,000 hemlock, 10,000,000 white oak, 7,000,000 red oak, 8,000,000 chestnut oak, 1,000,000 white pine, and 8,000,000 poplar, birch, chestnut, linden, hickory, locust, etc. Profits on tan bark alone will pay for the land. **$18 per acre.**

COAL, IRON, OIL, AND TIMBER LANDS.—7,000 acres on main line Norfolk and Western. Coal developed already; timber worth $88,000; complete prospectus furnished.

2,200 ACRES (coal and timber) HEMLOCK, SPRUCE, CHERRY, AND ASH. Will cut 18,000 feet per acre. One-half is Hemlock, balance principally Spruce. This tract is on the railroad and a navigable river, is magnificently timbered and underlaid with a Clarion seam of coal. The outcrop showing plainly over the property. It has not been developed as yet, the branch of the Wabash having but recently been completed. **Price, $40 per acre.**

2,000 ACRES, containing Hemlock, Spruce, Cherry, Ash, etc. One-half of this tract will cut 20,000 feet per acre. Balance will cut 15,000 feet per acre. This is a splendid timber proposition. Is on a railroad. Good ground for stocking. **$32 per acre.**

1,200 ACRES, containing Hemlock, Spruce, and Cherry. This tract is one mile from railroad. Will cut 18,000 feet per acre. **$28.**

7,000 ACRES, three miles from railroad, containing Hemlock, Oak, and Poplar. This tract will cut 9,000 feet per acre, of which one-third is Hemlock. **Price, $17 per acre.**

19,000 ACRES OF HEMLOCK AND SPRUCE, in Pocahontas county, W. Va., being on a navigable river and also railroad. This tract is claimed to be the finest tract of Spruce and Hemlock in W. Va., and has been estimated to cut 15,000 feet per acre of Hemlock and Spruce, besides a large quantity of Ash, Cherry, Bass Wood, and Maple, not included in this estimate. With the exception of about two thousand acres, the whole tract can be lumbered at one operation. The ground is smooth and in excellent shape to operate. **Price, $30 per acre.**

2,500 ACRES OF TIMBER on both sides of a navigable river, located on two lines of railroad. Will cut 8,000 feet per acre; 3,000 feet Oak per acre. This is a good, desirable property and is accessible, as aforesaid, to two railroads, which is an item in shipping lumber. **Price, $15 per acre.**

8,000 ACRES SPRUCE AND HEMLOCK, on railroad. Will cut not less than 20,000 feet per acre. It is situated in the county of Randolph and lies for several miles on the railroad and a navigable river. There is a splendid lot of bark on this tract, and it will eventually pay the purchase price of land. This is one of the very best propositions we know of in Spruce and Hemlock. **Price, $35 per acre.**

1,500 ACRES. It is located about two miles from railroad, and except for the fact that it is not directly on the railroad the description is the same as preceding property, but if possible it is slightly better timbered. **Price, $37 per acre.**

We have many other valuable timber and mineral properties in this state upon our books. Particulars on application.

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Very truly yours,

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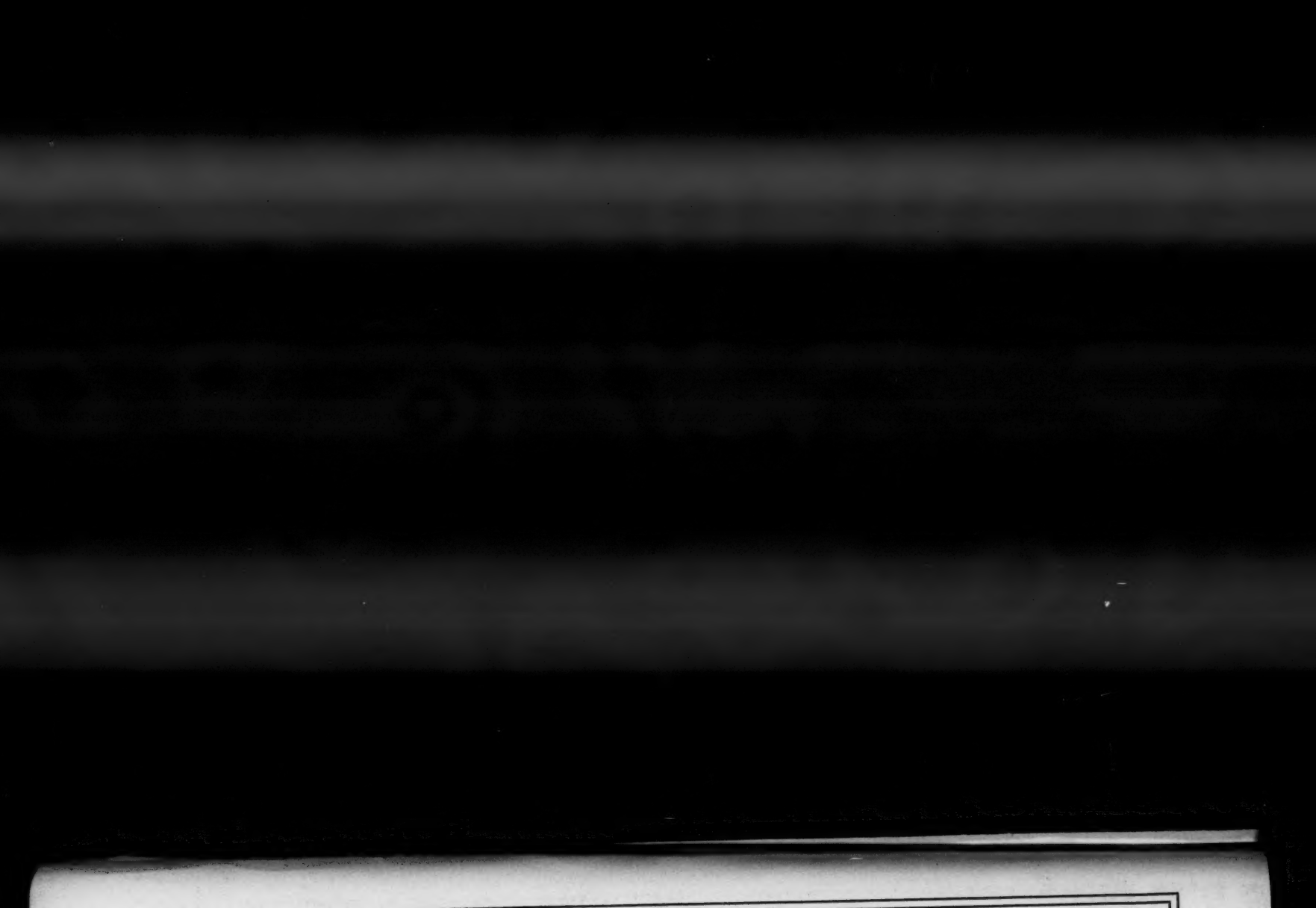
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